

Fourth Five Year Review Report for  
**SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION  
SUPERFUND SITE**

Winnebago County, Illinois

US EPA RECORDS CENTER REGION 5



462876



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## Contents

LIST OF ACRONYMS .....	3
EXECUTIVE SUMMARY .....	5
Five-Year Review Summary Form.....	6
I. INTRODUCTION.....	11
II. PROGRESS SINCE THE LAST REVIEW .....	12
Table 1: Protectiveness Determinations/Statements from the 2008 FYR Report .....	12
Table 2: Status of Recommendations from the 2008 FYR.....	13
III. REMEDY IMPLEMENTATION ACTIVITIES.....	14
Source Area 4.....	14
Source Area 7.....	15
Source Area 9/10.....	16
Source Area 11.....	18
Table 3: Summary of Planned and/or Implemented ICs .....	19
System Operation/Operation and Maintenance (O&M) Activities .....	19
IV. FIVE-YEAR REVIEW PROCESS .....	19
Administrative Components.....	19
Community Notification and Involvement .....	20
Document Review.....	20
Data Review .....	20
Table 4: Groundwater Contaminant Level Trends.....	20
Site Inspection.....	21
Interviews.....	22
V. TECHNICAL ASSESSMENT .....	23
Question A: Is the remedy functioning as intended by the decision documents? .....	23
Question B: ... Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? .....	25
Question C: Has any other information come to light that could call into question the protectiveness of the remedy? .....	27
Technical Assessment Summary.....	27
VI. ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS .....	28
Table 5: Issues and Recommendations/Follow-up Actions .....	28
VII. PROTECTIVENESS STATEMENT .....	28
VIII. NEXT REVIEW .....	32
IX. APPENDIX A – EXISTING SITE INFORMATION.....	33
SITE CHRONOLOGY .....	33
Table 6: Site Chronology .....	31
X. BACKGROUND.....	34
Table 7: COCs and PRGs as identified in the SERGWC Site June 2002 ROD.....	36
Table 8: Selected Remedial Actions for Source Areas 4, 7, 9/10, and 11 .....	43
Table 9: Actual O&M Costs .....	44
XI. APPENDIX B – additional maps, data, figures, or tables for reference.....	47

## LIST OF ACRONYMS

AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
AS/SVE	Air Sparge/Soil Vapor Extraction
bgs	Below ground surface
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminants of concern
DCA	Dichloroethane
DCE	Dichloroethene
DCM	Dichloromethane
DNAPL	Dense non-aqueous phase liquid
EPA	United States Environmental Protection Agency
ERH	Electrical Resistance Heating
ESD	Explanation of Significant Differences
ETX	Ethylbenzene, Toluene, Xylene
FYR	Five-Year Review
GAC	Granulated activated carbon
GMZ	Groundwater Management Zone
HS	Hamilton Sundstrand
ICs	Institutional Controls
ICIAP	Institutional Controls Implementation Plan
IDPH	Illinois Department of Public Health
IEPA	Illinois Environmental Protection Agency
LNAPL	Light non-aqueous phase liquid
LTRA	Long-term remedial action
Mg/kg	Milligrams per kilogram
Mg/L	Milligrams per liter
MCL	Maximum contaminant level
MIP	Membrane interface probe
MNA	Monitored natural attenuation
NAPL	Non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSA	Outside Storage Area
OU	Operable unit
PCE	Tetrachloroethene
PRG	Preliminary remediation goal
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RG	Remediation goal
ROD	Record of Decision



RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
SERGWC	Southeast Rockford Groundwater Contamination Site
TCA	Trichloroethane
TACO	Tiered Approach to Corrective Action Objectives
TCE	Trichloroethene
ug/kg	microgram per kilogram
UU/UE	Unlimited Use/Unrestricted Exposure
VI	Vapor intrusion
VOC	Volatile Organic Compound
WCHD	Winnebago County Health Department

## EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency, in consultation with the Illinois Environmental Protection Agency (IEPA), has completed the fourth Five-Year Review (FYR) of the Southeast Rockford Groundwater Contamination (SERGWC) Superfund Site in Rockford, Winnebago County, Illinois. The purpose of a FYR is to review site information to determine if the cleanup remedy being implemented is protective of human health and the environment. The triggering action for this statutory FYR of the SERGWC site is May 15, 2008.

The SERGWC site is a 10 square mile mixed residential and commercial area in the southeastern portion of the city of Rockford where groundwater is contaminated with volatile organic compounds (VOCs) that are derived from poor past waste-handling practices by local industry. Because the site is fairly large and complex, EPA broke it up into three portions termed “operable units” for ease of addressing site contaminants. In 1991, EPA made an initial cleanup decision in a Record of Decision (ROD) to provide municipal water to affected residential and commercial properties in Operable Unit 1 (OU1). A second ROD was issued in 1995 that outlined the groundwater contaminant plume area (OU2) and the overall plume cleanup approach including the use of monitored natural attenuation. The 1995 ROD also identified four primary sources of groundwater contamination, called “Source Areas 4, 7, 9/10, and 11.” EPA issued a 2002 ROD to address these primary sources of groundwater contamination as OU3.

Attenuation of the overall groundwater contaminant plume is being monitored by the city of Rockford under a 1998 Consent Decree with EPA. In Source Area 4, a soil removal action was conducted and a groundwater remedy is currently operating. The final Remedial Design (RD) for Source Area 4 soil cleanup is under development. A limited soil excavation and off-site disposal action was completed at Source Area 7 and remedial actions for contaminated Source Area 7 groundwater are under construction. Construction of the soil remedy at Source Area 9/10, a combination air sparge and soil vapor extraction (AS/SVE) system, with limited soil excavation and off-site disposal, is complete and operating. Groundwater in Source Area 11 is being sampled quarterly to determine if a monitored natural attenuation remedy is technically feasible to address the groundwater contaminant plume associated with that area.

EPA has determined that the completed OU1 remedy, provision of municipal water to 264 residences, is protective of human health and the environment. However, a protectiveness determination at OU2 will be deferred until further information is obtained. A deep soil investigation will be conducted by EPA to determine if vapor intrusion (VI) is impacting residential and commercial properties above the plume area. Additionally, EPA will perform a study of the Rock River to determine if ecological receptors are being adversely impacted by the discharge of contaminated groundwater into the river. Also, long-term protectiveness of the remedy for OU2 will require that residences over the plume area be connected to the city water supply or that institutional controls (ICs) be put into place to ensure that any residences within the plume area with owners that are refusing to hook up to city water will be connected in the future. Lastly, EPA has determined that the selected cleanup remedies for the four contaminant source areas (OU3) will be protective once all the remedies are fully implemented.

## FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
<b>Site Name:</b> Southeast Rockford Groundwater Contamination Site		
<b>EPA ID:</b> ILD981000417		
<b>Region:</b> 5	<b>State:</b> IL	<b>City/County:</b> Rockford/Winnebago
SITE STATUS		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> Yes	<b>Has the site achieved construction completion?</b> No	
REVIEW STATUS		
<b>Lead agency:</b> EPA		
<b>Author name (Federal or State Project Manager):</b> Timothy Drexler		
<b>Author affiliation:</b> Remedial Project Manager, EPA, Region 5		
<b>Review period:</b> 7/30/2012 - 5/15/2013		
<b>Date of site inspection:</b> 10/30/2012		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 4		
<b>Triggering action date:</b> 5/15/2008		
<b>Due date (five years after triggering action date):</b> 5/15/2013		

Issues/Recommendations
<b>OU(s) without Issues/Recommendations Identified in the Five-Year Review Report:</b>
OU1
<b>OU(s) with Issues/Recommendations Identified in the Five-Year Review Report:</b>

<b>OU(s):</b> OU2	<b>Issue Category:</b> Remedy Performance  <b>Issue:</b> Several residents within the plume area have declined to hook up their homes to the municipal water supply and are potentially being exposed to unacceptable health risks if drinking contaminated water.
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	<b>Recommendation:</b> Continue to work towards connecting remaining targeted residences to the Rockford municipal water supply.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA/IEPA/PRPs	EPA/IEPA	12/31/2014

OU(s): OU2	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> Potential indoor VI risks exist for residents living above the groundwater contaminant plume.			
	<b>Recommendation:</b> Conduct deep soil gas testing at residences in the plume area, evaluate results, and mitigate, if necessary.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA/IEPA/PRPs	EPA/IEPA	5/15/2014

OU(s): OU2	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> Contaminated groundwater discharging to the Rock River may be causing adverse effects to ecological receptors.			
	<b>Recommendation:</b> Perform a pore water study at the Rock River to determine the nature of any adverse effects on ecological receptors.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA/IEPA/PRPs	EPA/IEPA	5/15/2014

OU(s): OU2 and OU3	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> Certain institutional controls (ICs) need to be fully implemented to ensure long-term protectiveness of the remedy.			
	<b>Recommendation:</b> EPA and IEPA should prepare an Institutional Control Implementation and Assurance Plan (ICIAP) or similar IC plan for the site. The ICIAP should include the results of site ICs evaluation activity that has already been conducted and a plan for 1) future IC evaluation activity; 2) taking corrective measures to existing ICs, if needed; 3) placing additional ICs, if needed, and; 4) ensuring the long-term stewardship of the site, which includes on-going monitoring, maintenance, and enforcement of ICs.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA/IEPA	EPA/IEPA	9/26/2014

OU(s): OU2	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> EPA and IEPA should determine whether monitored natural attenuation of the groundwater contaminant plume is protective over the long term.			
	<b>Recommendation:</b> EPA and IEPA should update the groundwater model once construction of all Source Area cleanup remedies is completed.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA/IEPA	EPA/IEPA	5/15/2015

Protectiveness Statement(s)	
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU 1 is protective of human health and the environment because all immediate exposure pathways that could result in unacceptable health risks are being controlled. A total of 264 residences with contaminated private wells were connected to Rockford's municipal water supply and the private wells were properly abandoned to ensure that the wells could not be used in the future. Additionally, an activated carbon treatment unit that was installed at Rockford Municipal Well 35 is effective in removing VOCs from pumped groundwater so that this well can now be used to supply clean drinking water during periods of peak demand. (Placement of ICs that prohibit the use of contaminated groundwater underneath the residences will be addressed under OU2.)	

Protectiveness Statement(s)		
<i>Operable Unit:</i> OU2	<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date:</i> September 15, 2015
<i>Protectiveness Statement:</i> A protectiveness determination at OU2 will be deferred until EPA obtains further information. EPA and IEPA will conduct a deep soil investigation to determine whether VI is impacting residential and commercial properties above the plume area. In addition, long-term ecological impacts to the Rock River will be studied to determine if ecological receptors are adversely impacted by the discharge of site-related contaminated groundwater into the river. Also, long-term protectiveness of the remedy for OU2 will require that residences over the plume area be connected to the city water supply or that institutional controls (ICs) be put into place to ensure that any residences within the plume area with owners that are refusing to hook up to city water will be connected in the future.		
Protectiveness Statement(s)		
<i>Operable Unit:</i> OU3	<i>Protectiveness Determination:</i> Will be Protective	
<i>Protectiveness Statement:</i> Remedial actions at Source Areas 4, 7, and 11 have not yet been fully implemented.		

However, the Source Area remedies at OU3 are projected to be protective of human health and the environment upon their completion, along with the full implementation of site-wide ICs. Contaminants are present in subsurface soil, but under current conditions there is no potential for human exposure. Some ICs are in place to restrict groundwater usage within the source areas; in Source Area 7, an Environmental Restrictive Covenant covering soil and groundwater is in place. In a portion of Source Area 9/10, an Environmental Restrictive Covenant covering groundwater and land use is in place, but additional ICs are needed. Additional land-use restrictions may be needed at Source Areas 4, 7, and 11. When fully implemented, the site-wide ICs will effectively limit the potential for exposure to contaminated groundwater at the OU3 source areas. Compliance with site-wide ICs will be ensured by implementing, monitoring, and maintaining effective ICs as well as maintaining the site remedy components. Long-term stewardship of ICs must be provided for.

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## I. INTRODUCTION

EPA conducts FYRs at Superfund sites to evaluate the performance of cleanup remedies to determine if the remedies are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

EPA prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). CERCLA 121 states:

*“If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.”*

EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

*“If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.”*

EPA, in consultation with IEPA, has conducted the fourth FYR of the remedial actions implemented at the SERGWC Superfund Site in Rockford, Winnebago County, Illinois (see Figure 1). The SERGWC site consists of three operable units, all of which are addressed in this FYR report. EPA and IEPA are the lead agencies for developing and implementing the remedy at the site. IEPA, as the support agency representing the State of Illinois, has reviewed all site-related information and documentation and has provided input to EPA during the FYR process.

The triggering action for this statutory review is the completion date of the previous FYR report on May 15, 2008. This FYR is required because hazardous substances, pollutants, or contaminants remain at the SERGWC site above levels that allow for unlimited use and unrestricted exposure (UU/UE).



## II. PROGRESS SINCE THE LAST REVIEW

**Table 1:** Protectiveness Determinations/Statements from the 2008 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy at OU 1 is protective of human health and the environment, all immediate health threats and exposure pathways that could result in unacceptable risks are being controlled. All 264 residences with contaminated private wells were provided a clean, alternative drinking water supply via the hook-up of those residences to Rockford's municipal water supply. Impacted residential wells were also properly abandoned to ensure that the wells could not be used in the future. Additionally, the activated carbon treatment unit installed at Rockford Municipal Well 35 is effective in removing VOCs from the groundwater so that this well can now be used to supply clean drinking water during periods of peak demand. ICs prohibiting the use of contaminated groundwater are addressed under OU2.
2	Short-term Protective	The remedy at OU2 is protective of human health and the environment in the short term. All immediate health threats through the ingestion of contaminated drinking water were eliminated. An additional 283 homes/businesses now have a clean, alternate drinking water supply via the hook-up to Rockford's municipal water system. Existing private wells were also properly abandoned so the affected wells can no longer be used. Additionally, groundwater monitoring results show that natural attenuation of the aquifer is occurring. ICs to restrict groundwater usage are in place. Local ordinances are in place that requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a new well and for property owners to obtain a well permit for a new well or for well repairs. These measures help to eliminate the potential for exposure to contaminated groundwater at the site. However, in order for the remedy to be protective in the long-term, several additional actions need to be implemented. These actions include a more in-depth study of the ordinance to assure long-term effectiveness, and a current evaluation of the groundwater plume to determine if the plume has migrated into previously unimpacted areas. If it is determined that this migration has occurred or is imminent, then it will be necessary to determine whether there are any exposures of concern. Additionally, long-term protectiveness requires compliance with the groundwater-use restrictions. Compliance with effective ICs will be ensured by implementing, monitoring, and maintaining effective ICs as well as maintaining the site remedy components. Long-term stewardship must be ensured to verify compliance with ICs.
3	Will be Protective	The remedies at OU3 are expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The remedy has not been fully implemented at Source Areas 4, 7, 9/10, and 11. Although contaminants are present in subsurface soil, under current conditions there is no potential for human exposure. ICs to restrict groundwater usage within the site are in place. Affected homes and businesses that are located within a source area are also located within the larger area of the groundwater plume; therefore, the ICs implemented under the OU2 ROD effectively limit the potential for exposure to contaminated groundwater at the OU3 source areas. Land-use restrictions are not in place. However, an IC evaluation study will be performed and an IC plan developed. Additionally, long-term protectiveness requires compliance with the groundwater-use restrictions. Compliance with effective ICs will be ensured by implementing, monitoring, and maintaining effective ICs as well as maintaining the site remedy components. Long-term stewardship must be ensured to verify compliance with ICs.

**Table 2: Status of Recommendations from the 2008 FYR**

<b>OU #</b>	<b>Issue</b>	<b>Recommendations/ Follow-up Actions</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Original Milestone Date</b>	<b>Current Status</b>	<b>Completion Date (if applicable)</b>
2	A groundwater plume may have migrated into previously unimpacted areas and there may be a potential for potable well users to be exposed to contaminated groundwater.	Evaluate whether the groundwater plume has migrated into previously unimpacted areas. If it is determined that this migration has occurred or is imminent, then it will be necessary to determine whether there are any exposures of concern.	PRP	EPA/State	11/15/2008	Completed	9/30/2012
2	ICs have not been fully evaluated at OU2. A review of the ICs is needed to assure that the remedy is functioning as intended with regard to the ICs and to ensure effective procedures are in-place for long-term stewardship at the site	Conduct an IC evaluation study for OU2. An IC Plan will be developed by EPA within six (6) months of completing the IC study. The Plan will incorporate the results of the evaluation activities and plan for additional IC activities as needed including planning for long-term stewardship	EPA/State	EPA/State	5/15/2009	Ongoing	Planned for 9/26/2014
3	ICs (land use restrictions) are not in place at OU3 Source Areas 4 and 11.	Conduct an IC evaluation study and develop an IC Plan for the OU3 source areas	EPA/State	EPA/State	3/15/2009	Ongoing	5/26/2014
3	ICs (land use restrictions) are not in place at OU3 Source Area 9/10.	Conduct an IC evaluation study for the Hamilton Sundstrand property and develop an IC Plan for the OU3 source areas	PRP	EPA/State	3/15/2009	Completed	8/4/2011

The original groundwater contaminant plume map for the SERGWC site (see Figure 2) was updated by EPA to reflect current groundwater sampling data (see Figure 3). Currently, EPA, IEPA, and the city of Rockford are evaluating the revised map to identify whether any residents or businesses within the contaminant plume footprint still use private water wells so that they may be offered a connection to the municipal water supply.

IEPA is currently developing an IC Work Plan for OU2 and for Source Areas 4, 7, and 11 identified in OU3. The work plan will include strategies for identifying residents/businesses within the SERGWC contaminated groundwater plume that are still using private wells and effective methods for connecting all of those homes/businesses to the municipal water system. The IEPA IC Work Plan under development will identify land-use restrictions, as needed, for Source Areas 4, 7, and 11. Land-use restrictions on the Hamilton Sundstrand (HS) property portion of Source Area 9/10 were identified in an August 4, 2011 Environmental Restrictive Covenant, which states that property use will remain industrial/commercial.

### **III. REMEDY IMPLEMENTATION ACTIVITIES**

#### **OU2**

Remedy implementation activities for OU2 since the 2008 FYR report include continued semiannual monitoring of the contaminated groundwater plume by the city of Rockford utilizing the identified monitoring well network (see Figure 4). Please see the “Data Review” portion of Section IV of this FYR report for an evaluation of the latest monitoring data from the OU2 well system. In addition, Rockford continues to utilize a granulated activated carbon treatment system to treat water pumped from Municipal Water Well 35 before distributing it to customers and the city also monitors site-related contaminants of concern (COCs) in that well in accordance with the 1995 ROD.

EPA updated the groundwater contaminant plume map contained in the 1995 ROD by incorporating the monitoring well system and groundwater wells associated with the identified source areas. With assistance from IEPA and the city, EPA is utilizing the revised map to see if any Rockford residents and businesses within the newly-defined contaminant plume area use private drinking water wells. IEPA is developing an IC Work Plan that will contain strategies for connecting all (remaining) homes and businesses within the site groundwater contaminant plume footprint to municipal water.

#### **OU3**

##### **Source Area 4**

Source Area 4 is located east of Marshall Street, south of Harrison Avenue and north of Alton Avenue in a mixed industrial/commercial and residential area (see Figures 4 and 5). Source Area 4 is comprised of a building and associated parking lot that formerly housed Swebco Manufacturing, Inc., a precision metal machine shop. Currently, the building is occupied by a wood pallet manufacturing and refurbishing operation. The remedy for contaminated soil at Source Area 4, as identified in the 2002 ROD, was *ex situ* thermal remediation through excavation and on-site low-temperature thermal desorption. Contaminated

groundwater at Source Area 4 is to be addressed by a leachate containment system. In September 2005, an interim removal action was conducted to excavate highly-contaminated surface soil to eliminate direct contact exposures. Afterwards, IEPA completed construction of a leachate extraction and granulated activated carbon (GAC) treatment system which became operational and functional on October 6, 2010, signifying the transition to the long-term remedial action (LTRA) phase. Leachate is extracted at a rate of approximately 60 gallons per minute (gpm) through a series of three extraction wells, submersible pumps, piping, and controls. The treatment consists of an oil-water separator, air stripper, bag filters, and separate carbon filtration units for the liquid and vapor effluent streams. After a period of operation, the vapor effluent concentration was low enough that the vapor carbon filtration units were no longer needed and were bypassed in the vapor effluent stream. However, the vapor effluent concentration continues to be monitored. The liquid effluent is discharged on-site to a storm water ditch and the vapor effluent is discharged to the atmosphere. Effluent is monitored monthly for VOCs to confirm the leachate is treated to acceptable levels. An anti-scalent and microbiocide are injected into the extraction wells during warmer months due to the presence of an iron slime bacteria that was causing a pumping rate loss.

A groundwater management zone (GMZ) was established for Source Area 4 in accordance with the 2002 ROD. The Source Area 4 GMZ consists of 7 monitoring wells, 3 groundwater extraction wells and one multi-level well with five sampling ports. Two sets of shallow and deep monitoring wells are GMZ compliance wells, MW22A and B and MW130A and B.

During pre-design evaluations for the selected soil remedy, IEPA discovered significant construction challenges related to an existing building on the site and it estimated a significant increase in the volume of contaminated soil. In addition, a pre-design pump test revealed that the aquifer's high hydraulic conductivity would make dewatering the planned excavation both time consuming and expensive. Therefore, in mid-2011, IEPA began evaluating potential *in situ* soil remedies to replace the selected *ex situ* soil remedy. Soil and groundwater sampling was performed around and inside the existing building during October 2011 to obtain the data necessary to evaluate the suitability of an *in situ* thermal remedy. After analyzing the sampling data, the planned soil remedial action was changed to electrical resistance heating (ERH), an *in situ* thermal remedy, through a July 2012 Explanation of Significant Differences (ESD) decision document. IEPA is currently completing the design for ERH at Source Area 4 in preparation for remedy implementation in summer 2013.

## **Source Area 7**

Source Area 7 is located in the most southeastern portion of the SERGWC site, northwest of the intersection of Alpine and Sandy Hollow Road (see Figures 4 and 6). Source Area 7 contains Ekberg Park, a municipal park owned and maintained by the Rockford Park District. The park consists of open grassland, paved tennis and basketball courts, a children's playground, and a parking area. Source Area 7 also includes privately owned agricultural land and wooded areas to the south and north of the park.

The remedy for Source Area 7 soil, as identified in the 2002 ROD, was a soil vapor extraction (SVE) and air sparge (AS) system with vapor treatment by catalytic oxidation. Leachate would be addressed by using a multi-phase extraction and collection/containment approach with treatment by air stripping and on-site surface water discharge. Groundwater use restrictions

would also be imposed. On March 27, 2008, an Environmental Protection Easement and Declaration of Restrictive Covenants was filed in Winnebago County restricting soil and groundwater use at Source Area 7. Since the 2008 FYR, pre-design investigations have been performed at Source Area 7 that led to modification of the remedy to include limited soil excavation and off-site disposal. Four additional monitoring wells were also installed to further delineate the Source Area 7 groundwater contaminant plume, and a subsurface soil investigation was conducted in August 2010 to define the southern extent of VOC contamination in the soil and groundwater.

The design plans for Source Area 7 are complete and groundwater extraction wells have been installed in preparation for installation of the groundwater cleanup remedy. Treatment plant construction is planned to begin in summer 2013.

Results of SVE pilot testing at Source Area 7 showed that soils above the water table in the area of highest soil contamination were generally impermeable and thus not conducive to remediation by SVE. Additionally, during the installation of the pilot test wells, fill and soil contamination was encountered as shallow as four feet below ground surface (bgs) with heavily contaminated soil, and a non-aqueous phase liquid (NAPL) contaminant layer was found slightly deeper. IEPA and EPA determined that excavation with off-site disposal would be the most appropriate remedy for these shallow soils to achieve an immediate reduction in contaminant levels and to reduce the amount of time required to implement the groundwater remediation system. An ESD for limited soil excavation with off-site disposal was issued on May 3, 2010. Pre-design work to delineate the contaminated soil for removal and characterization was conducted in October 2010. Excavation and off-site disposal of the contaminated soil began in December 2010 and was completed on April 26, 2011, removing a total of 5,372 tons for off-site disposal. After backfilling the excavation with clean off-site soil, site restoration activities were completed on November 21, 2011.

EPA approved IEPA's design plans for multi-phase groundwater treatment on January 28, 2013. The cleanup approach includes 38 multi-phase extraction (MPE) wells and 14 containment extraction wells at a total flow rate of approximately 210 gpm. The MPE wells will also extract contaminated soil vapor and product. Installation of the 14 leachate containment/extraction wells was completed on February 1, 2013. Construction of the Source Area 7 treatment plant is planned for completion in 2014.

### **Source Area 9/10**

Source Area 9/10 is an industrial area that is bounded by 11th Street on the east, Twenty-Third Avenue on the north, Harrison Avenue on the south, and 6th Street on the west (see Figures 4 and 7). The properties to the immediate north of Area 9/10, across Twenty-Third Avenue, are zoned residential and to the south, across Harrison Avenue, are zoned commercial and mixed residential.

The remedy for Source Area 9/10, identified in the 2002 ROD, was additional site characterization to determine the most efficient configuration for an AS/SVE system. The need for a GMZ was also identified, along with institutional controls (ICs) on groundwater usage within the GMZ.

Hamilton Sundstrand (HS), the potentially responsible party (PRP) for a significant portion of Source Area 9/10, conducted a pre-design investigation of the its plant building located in Source Area 9/10 from November 2008 to April 2009. The investigation consisted of biased and unbiased soil borings, emplacement of remedial action monitoring wells, groundwater sampling, and geotechnical sampling. Groundwater sampling results were used to generate a supplemental RD which, combined with previous data, was the basis for the final design of the AS/SVE system. Groundwater contaminant concentrations greater than two orders of magnitude above the cleanup objectives were used as criteria for emplacement of the AS/SVE system wells. The AS/SVE system was constructed in two phases on the HS property.

The Phase 1 AS/SVE System began full-scale operation in December 2009. Phase 1 is composed of 15 AS wells and six SVE wells which operate as three separate cells operating in sequence. The Phase 1 System is located in the southwestern portion of the HS property comprising approximately 13,500 square feet. The Phase 2 system, which began operation in March 2011, consists of 44 AS wells and nine SVE wells in two cells operating in sequence. The Phase 2 System is located in the west-central portion of the HS facility, comprising approximately 37,800 square feet.

The AS wells inject air approximately 52 feet bgs. The approximate depth to groundwater is 28 feet bgs. Contaminant vapor from the AS/SVE system was treated with granulated activated carbon (GAC) units until effluent VOC concentrations no longer exceeded permit required conditions. System SVE discharge sampling is performed monthly to track the average VOC mass removal rates from each SVE cell versus time of operation. From start up through September 2012, the cumulative mass of VOCs removed was an estimated 1,711 pounds. Controls are in place to operate the system 24 hours/day 365 days/year, except for planned maintenance. The system is equipped with a telemetry system to provide notification of any system alarm and/or shut down and remote system restart. The AS/SVE system was placed in pulse mode in June 2012, to increase the efficiency of VOC extraction and treatment. Pulse-off cycles have occurred from 1) June 1, 2012 to August 14, 2012, 2) September 14, 2012 to November 14, 2012, and 3) December 14, 2012 to February 14, 2013. The HS GMZ network consists of fifteen wells; ten downgradient compliance wells, and five upgradient monitoring wells.

After the 2002 ROD identified AS/SVE as the remedy for Source Area 9/10 to address contaminated soil, a 2003 pre-design subsurface investigation found that the majority of VOC-contaminated soil in the Outside Container Storage Area (OSA) was within 4-6 feet bgs. Additionally, an AS/SVE pilot test identified technical challenges that would limit the effectiveness of the AS/SVE system to treat the OSA. An ESD was issued in February 2009 to modify the Source Area 9/10 remedy in the OSA to: 1) inject glycerol polylactate to enhance natural attenuation, 2) excavate contaminated soil and dispose of offsite, and 3) place a three-foot clay cap over remaining residually-contaminated soil. A total of 734 tons of contaminated soil was excavated and disposed of offsite in November 2010. After confirmatory samples were collected, the cap was placed over the excavation. Subsequent evaluation of soil samples collected adjacent to the OSA excavation revealed that concentrations of VOCs were still above acceptable levels using the Illinois Tiered Approach to Corrective Action Objectives (TACO) soil-to-Class I groundwater pathway for PCE of 0.06 mg/kg. A combination of *in situ* injection of sodium permanganate, a chemical oxidizer, and soil mixing using sodium permanganate, was implemented in June 2012 to reduce the contaminant concentrations to acceptable levels.

ICs, another requirement of the 2002 ROD, were generated by HS for their portion of the Source 9/10 Area in the form of a restrictive covenant on the HS property. The environmental covenant was recorded with Winnebago County on August 26, 2011 and provides for activity and use restrictions on all current and future property owners and users. Restrictions include: industrial land use, a prohibition on groundwater use outside of remedial actions, and a prohibition on interference with the remedy.

### **Source Area 11**

Source Area 11 is situated in a mixed industrial, commercial, and residential area of Rockford and is located east of Eleventh Street at the corner of Eleventh Street and Harrison Avenue (Figures 4 and 8).

The cleanup alternative selected for Source Area 11 contaminated soils was SVE, and a No Action alternative with monitoring and groundwater-use restrictions was selected for leachate. Further site investigative activities using a membrane interface probe (MIP) to sample soil and groundwater was conducted in 2007-08 and results indicated that the majority of the contamination (ethylbenzene, toluene, and xylenes) was located beneath the groundwater table with no significant contamination being found in the vadose zone. A subsequent round of MIP soil and groundwater sampling was conducted downgradient of the site in 2010.

Sampling results for the contaminated groundwater plume at Source Area 11 led EPA to conclude that the properties and concentrations of contaminants emanating from this source area may be well suited to a monitored natural attenuation remedy (MNA). Currently, IEPA is completing a 2-year study of groundwater samples collected from a monitoring well network in Source Area 11 and down gradient of that source. When complete, IEPA will re-evaluate the potential for an MNA remedy. No contaminated soil has yet been found in Source Area 11.

IEPA may conduct additional soil investigations at Source Area 11, pending the city's plan to demolish commercial buildings on the northeastern corner of Harrison Street to expand that roadway. If a contaminant source should be found in the vadose zone, then the SVE soil remedy will be implemented.

**Table 3: Summary of Planned and/or Implemented ICs**

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	OU2	Groundwater-use restriction within the contaminant plume and buffer zone; eventual connection to city water for those still using private wells.	Formal notification from the Winnebago County Health Department and notification at time of property transactions to buyer and seller, planned for June 2014.
Groundwater	Yes	Yes	Source Areas 4, 11	Groundwater use restriction within the GMZ.	Declaration of Restrictive Covenants or notice, planned for June 2014.
Groundwater	Yes	Yes	Source Areas 7, 9/10	Groundwater use restriction within the GMZ.	Declaration of Restrictive Covenant; HS portion of Source Area 9/10, August 2011; Illinois Restrictive Covenant, Source Area 7, May 2008.

### System Operation/Operation and Maintenance (O&M) Activities

Semi-annual groundwater monitoring in OU2 continues by the city to characterize the overall site contaminant plume. There are currently 21 well locations in the monitoring system. Of these, eight locations are nested wells screened in different elevations within the aquifer. As previously described, the LTRA for Source Area 4 groundwater began in October 2010 and continues to date. O&M of the full AS/SVE system at Source Area 9/10 began in March 2011.

## IV. FIVE-YEAR REVIEW PROCESS

### Administrative Components

The PRPs and IEPA were notified of the initiation of the FYR by letter on July 30, 2012. The SERGWC Superfund Site FYR was conducted by Timothy Drexler, EPA Remedial Project Manager and Mike Joyce, EPA Community Involvement Coordinator (CIC). Doyle Wilson, IEPA Project Manager, assisted with the review.

The review consisted of the following components:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Five-Year Review Report Development and Review.



## Community Notification and Involvement

EPA published a notice in a local newspaper, the *Rockford Register Star*, on October 3, 2012, which stated that it was beginning the (fourth) FYR of the site. The public was invited to submit comments to EPA concerning the site and was told that the FYR report will be made available at the site information repository located at the Rockford Public Library, Main Branch, 215 N. Wyman Street, Rockford, Illinois. No comments were received.

## Document Review

This FYR consisted of a review of relevant site documents including: 1) the 1991, 1995, and 2002 RODs, 2) the 1998, 1999, 2001, and 2008 Consent Decrees, 3) the 2009, 2010, and 2012 ESDs, 4) the 2003 AOC, 5) LTRA records from Source Areas 4, and 6) monitoring data from the overall plume network and Source Areas 7, 9/10, and 11. Applicable groundwater and soil cleanup standards as listed in the 1995 and 2002 RODs were also reviewed.

## Data Review

Sample results generated as a part of the semi-annual overall plume groundwater monitoring program conducted by the city of Rockford, in accordance with the September 1995 ROD and 1998 CD, were reviewed to evaluate trends in groundwater concentration and any changes to the plume outline. The most recent data, collected in November/December 2012 by the city, was contained in a February 1, 2013 report. Source Area 4 GMZ network data was also reviewed from reports generated for IEPA in accordance with the 2002 ROD. Additionally, sampling data was reviewed from the GMZ Monitoring Well Network associated with the HS portion of Source Area 9/10, collected as a part of the 2002 ROD and 2008 CD. Sampling data, collected as a part of the Source Area 9/10 OSA evaluation, and data from the Source Area 4 soil remedy evaluation and Source Area 7 soil excavation were likewise evaluated to provide information on the effectiveness of the remedial actions in those areas. Soil data collected as a part of pre-design work and remedial action in Source Area 11 were also reviewed.

**Table 4: Groundwater Contaminant Level Trends**

Source Area	Media	COC	High Value (mg/L) ( <input type="checkbox"/> = Exceeds PRG)	12-month Trend (Date-Direction)
4 GMZ	Groundwater	1,1,1 –TCA	0.290 <input type="checkbox"/>	2011-Down
4 GMZ	Groundwater	1,1 DCE	0.0092 <input type="checkbox"/>	2011-Down
4 GMZ	Groundwater	PCE	0.02* <input type="checkbox"/> (*limit of detection)	2011-Down
9/10 GMZ	Groundwater	PCE	0.086 <input type="checkbox"/>	2011-No trend
9/10 GMZ	Groundwater	TCE	0.024 <input type="checkbox"/>	2011-No trend
9/10 GMZ	Groundwater	1,1-DCE	0.0071 <input type="checkbox"/>	2011-Down
9/10 GMZ	Groundwater	Vinyl chloride	0.0054 <input type="checkbox"/>	2011- Up

The site-wide monitoring well network is sampled semi-annually by the city, which allows EPA to continue to collect information on the natural attenuation of site-related contaminants within the groundwater contaminant plume. The results show a decrease in contaminant concentration in many wells, with some exceptions. Contaminants in monitoring wells downgradient and near Source Area 7 are increasing in concentration over time. MW-102 has seen total VOCs rise in shallow, intermediate, and deep-screened intervals over the period from 1999 to 2013. Notable

is *cis*-1,2-DCE, which was detected in MW-102C at 0.2 mg/L (its MCL is 0.07 mg/L). Likewise, MW-133 has also seen an increase in total VOC concentrations, with a detection of 1.3 mg/L for *cis*-1,2-DCE in MW-133B. This is not unexpected, since it will take time for the results of the contaminated soil excavation at Source Area 7 to be reflected in downgradient wells, and the groundwater remedy is not yet in place. Once the treatment/containment system is operating at Source Area 7, it is expected that groundwater concentrations downgradient from this source area will begin to drop.

Some monitoring well data near the Rock River also show an increasing trend in contaminant concentrations. In well MW-206B, *cis*-1,2 DCE concentrations are at 0.13 mg/L and TCE concentrations are at 0.41 mg/L (the TCE MCL is 0.05 mg/L). This trend shows that the plume flows into the Rock River, which was anticipated in the original groundwater computer model generated for the 2002 ROD. EPA will revise the site-wide groundwater model so it can estimate how long it will take for the plume to naturally attenuate and reach cleanup goals once all of the containment/treatment systems are in operation. At that time, a determination will be made on whether the calculated cleanup timeframe for site-wide natural attenuation is considered to be reasonable.

The Source Area 4 leachate extraction and treatment system continues to operate effectively as designed. Initial baseline sampling was conducted in November 2009, followed by quarterly sampling for two years, and then with the first round of semiannual sampling occurring in July 2012. During baseline sampling one downgradient compliance well (MW130A) had an exceedance for 1,1,1-TCA at 0.37 mg/L and one downgradient well within the GMZ exceeded the remediation goals (RGs) for 1,1,1-TCA (0.32 mg/L), 1,1-DCE (0.011 mg/L), and TCE (0.006 mg/L). During 2011, MW130A only exceeded the RG for 1,1,1-TCA during the first quarter (0.29 mg/L). Since July 2011, however, all compliance well sample results are below MCLs.

Source Area 9/10 annual GMZ reports have been generated by Hamilton Sundstrand for 2009, 2010, and 2011. The 2011 Annual GMZ Report showed that six of the ten compliance monitoring wells had exceedances of groundwater RGs for one or more COCs during the year. Three wells had exceedances for TCE, with a high value of 0.0081 mg/L, and five wells had exceedances for PCE with a high value of 0.077 mg/L. The highest reading for TCE occurred in an upgradient well (SMW19), located on the Hamilton Sundstrand property, with a value of 0.024 mg/L. The trends of COC concentrations in downgradient wells during 2010-11 were generally downward; however, increases in vinyl chloride levels were recorded in two wells (high value of 0.0054 mg/L) that will need to be monitored over time.

Source Area 11 monitoring well results indicate that concentrations of site-related contaminants drop rapidly with distance from the source area. Concentrations from well A11-MW002 had concentrations of ethylbenzene and total xylenes of 3.9 mg/L and 16.4 mg/L, respectively, exceeding RGs for these compounds. None of the downgradient Source Area 11 monitoring wells appeared to exceed RGs for any COC.

### **Site Inspection**

EPA conducted the FYR site inspection on October 30, 2012. In attendance were Tim Drexler, EPA; Doyle Wilson and Michelle Tebrugge, IEPA; Tim Holdeman, Ashley Bernard, and Brad

Holcomb, city of Rockford; Amy Gahala, U.S. Geological Survey (on detail to EPA); Scott Moyer, United Technologies (representing Hamilton Sundstrand); John Puckett, STANTEC (Hamilton Sundstrand's contractor); Brett Baker, Bodine Environmental Services (subcontractor to CDM Smith); and John Grabs, CDM Smith (IEPA's contractor). The purpose of the inspection was to assess conditions so that EPA may determine the protectiveness status of the remedy. The site inspection included a visual evaluation of the four Source Areas that was led by the treatment systems operator, an inspection of a subset of the monitoring well network, and a review of current and planned actions in each Source Area.

All of the Source Area facilities were in good condition as were the monitoring wells that were examined. The Source Area 4 treatment system trailer and vault were dry and operating in good condition. The Source Area 7 soil excavation area was in good condition with re-established groundcover and poplar trees. At Source Area 7, EPA observed that the extraction wells were being installed. However, IEPA noted that the drilling contractor was having difficulty penetrating some of the soil areas, which delayed the schedule. The Source Area 9/10 AS/SVE system was pulsed off at the time of the inspection. The OSA excavation area groundcover looked well established. There were no systems operations at Source Area 11 to observe.

During the inspection, EPA discussed the need to continue to monitor residences that have to-date refused hook-up to municipal water. IEPA and the city expressed their desire to cooperate in updating the list of residents that have refused municipal hookup, to mail periodic notifications, and to ensure that when these properties are sold the new owner agrees to connect the home to the municipal water supply.

The city also expressed a concern with the continued operation of Municipal Well 35, stating that they would rather plug and abandon the well. EPA responded that the city already has the ability to properly abandon this well under the terms of the CD with EPA.

## **Interviews**

EPA also conducted interviews with parties involved with the site, including current landowners of the Source Areas, local health agencies, and area regulatory agencies. The purpose of the interviews was to document any perceived problems or successes with the remedies that have been implemented to-date. Interviews were conducted in January and February 2013. Generally, those interviewed had no major issues with the remedy as implemented to-date. Concerns were expressed about the few residents that still refuse municipal water and continue to use private wells despite potential health risks. Suggestions were made about periodically sampling the private wells and ensuring the eventual connection of all residences to municipal water. As for future actions, it was suggested that the groundwater model for the site be updated. The owner of Source Area 7 also suggested that its future use should include agricultural areas.

Complete interview notes are found in Appendix B.

## V. TECHNICAL ASSESSMENT

### **Question A: Is the remedy functioning as intended by the decision documents?**

#### ***Remedial Action Performance: Site-wide Plume Natural Attenuation***

As stated earlier, the trend in contaminant concentrations is downward in many wells within the overall SERGWC site groundwater contaminant plume. However, downgradient and near Source Area 7, concentrations in some monitoring wells are increasing. The plume has migrated to the Rock River and has also expanded laterally to include additional residential/business areas to the north and south, as shown in the revised plume map (see Figure 3). EPA, IEPA, and the city of Rockford are evaluating the new plume outline to identify any new homes/businesses that may have private wells within the plume for possible connection to the municipal water system. As previously mentioned, some residents within the SERGWC plume area have, to-date, refused connection to municipal water and are potentially being exposed to unacceptable health risks by drinking contaminated water.

Once the groundwater remedy in Source Area 7 is operating, EPA anticipates that contaminant concentrations downgradient of Source Area 7 will diminish. As previously stated, additional data is needed on deep soil gas in residential and commercial areas to determine whether there is potential for human health risks from soil vapor exposure. Additionally, pore water samples are needed from the Rock River to determine the potential for ecological risks in the river.

Once all of the Source Area remedies are complete and operating, EPA will revise the site-wide groundwater model so that it can estimate how long it will take for the plume to naturally attenuate and reach cleanup goals. At that time, a determination will be made on whether the calculated cleanup timeframe for site-wide natural attenuation is considered to be reasonable.

#### ***Remedial Action Performance: Source Area 4 Groundwater and Soil***

The Source Area 4 leachate extraction and treatment system is functioning as intended in the decision documents. Based on the periodic groundwater sampling results from the GMZ well network, the leachate system is effectively containing the groundwater contaminant plume. An updated groundwater model should assist in estimating how long active cleanup operations are expected to continue. At that time a determination will be made on whether the calculated cleanup timeframe for Source Area 4 is considered reasonable.

The revised remedy of *in situ* ERH for contaminated soil at Source Area 4, once complete, should be effective in reducing soil contamination to below action levels.

#### ***Remedial Action Performance: Source Area 7 Groundwater and Soil***

The Source Area 7 soil vapor and leachate containment and extraction/treatment system is expected to operate effectively, as designed, once construction is complete. Once it is operational, the Source Area 7 remedy is expected to function as intended in the decision documents. Excavation and off-site disposal of the more highly-contaminated and less permeable soil effectively removed much of the contaminant source in Source Area 7, which

would have been difficult to remediate using multi-phase extraction wells. Periodic groundwater sampling of the GMZ well network should show that the leachate system effectively contains the contaminated groundwater plume. An updated groundwater model should assist in estimating how long active cleanup operations will be needed at Source Area 7. At that time a determination will be made on whether the calculated cleanup timeframe for Source Area 7 is considered reasonable.

#### ***Remedial Action Performance: Source Area 9/10 Groundwater and Soil***

The Source Area 9/10 AS/SVE system is functioning as intended by the decision documents and the remedy continues to operate effectively as designed. Based on the periodic groundwater sampling results from the GMZ well network, the leachate system is containing most of the contaminated groundwater plume.

The OSA soil contamination area was effectively addressed by: 1) the injection of glycerol polylactate to enhance natural attenuation, 2) the excavation and off-site disposal of contaminated soil, and 3) the emplacement of a three-foot clay cap over the remaining residually contaminated soil. The subsequent combination of *in situ* injection of sodium permanganate, a chemical oxidizer, and soil mixing using sodium permanganate, was effective in reducing the residual concentrations of COCs in the soil.

#### ***Remedial Action Performance: Source Area 11 Groundwater and Soil***

The Source Area 11 remedial action for groundwater is projected to function as intended by the decision documents once the design plans are complete and construction begins. RA is anticipated to be monitored natural attenuation. Based on groundwater monitoring results to-date, COCs from Source Area 11 attenuate rapidly downgradient of the source. A revised groundwater model will estimate how long it will take for the groundwater contaminant levels at Source Area 11 to achieve MCLs. At that time a determination will be made on whether the calculated natural attenuation timeframe is considered to be reasonable.

#### ***System Operations/O&M: Source Area 4***

Source Area 4 groundwater operations are currently in a 10-year LTRA status. Operating procedures, as implemented, will maintain the effectiveness of the groundwater remedy. LTRA costs have been stable, so far, indicating a smooth transition into long-term O&M with no anticipated remedy problems. Once complete, it is anticipated that the final soil remedy for Source Area 4 will be effective at reducing soil contaminant concentrations to RGs. Once ERH is complete, it is anticipated that O&M of a soil remedy will not be needed.

#### ***System Operations/O&M: Source Area 9/10***

Source Area 9/10 AS/SVE operations are currently in the O&M phase. Operating procedures, as implemented, will maintain the effectiveness of the remedy. O&M costs are borne by the PRPs. No remedy problems are anticipated.

### ***Opportunities for Optimization***

The Source Area 9/10 AS/SVE system has been operating in pulse mode since 2012, increasing the efficiency of that system. Once remedies are in place and operating in Source Areas 4, 7, and 11, it is projected that there will be opportunities for optimization, such as combining operations to reduce personnel and combining sampling events to reduce mobilization costs. Other opportunities for optimization will also be explored as work progresses.

### ***Early Indicators of Potential Issues***

There are currently no indications of potential issues related to system operations. As previously stated, deep soil gas sampling information is needed to determine whether there may be a risk of VI to residences and businesses in the overall plume area. Additionally, pore water sampling of the Rock River is needed to determine whether there is any potential ecological risk from the discharge of site-related contaminants to the river.

### ***Implementation of Institutional Controls and Other Measures***

Access controls currently in place are adequate in the Source Areas. Frequent inspections have shown that fencing and signage at Source Areas 4 and 9/10 remain protective. Currently, no access controls are needed for Source Areas 7 and 11.

A restrictive covenant placed on the HS portion of Source Area 9/10 provides an adequate IC for that portion of the SERGWC site. Restrictive covenants or updates of current restrictive covenants are planned for Source Areas 4, 7, and 11. Once the remedy is complete at Source Area 4, a restrictive covenant will no longer be necessary.

All soil excavation and off-site disposal tasks are complete for all Source Areas of the SERGWC site.

**Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?**

### ***Changes in Standards and TBCs***

The contaminant-specific standards and relevant “to-be-considered” (TBC) levels found in the cleanup decision documents for the SERGWC site were reviewed against current standards and found to still be valid. EPA recommends no changes be made.

### ***Changes in Exposure Pathways***

There have been no significant changes in either land use or expected land use. Land use in the area encompassing the SERGWC site remains a mix of residential and commercial.

Human health routes of exposure were evaluated as a part of this FYR. Based on a review of recent monitoring well data, the current concentrations of the VOCs in the groundwater plume at the site are above recommended screening levels for potential VI into residential dwellings. VI is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile

chemicals in contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. In extreme cases, the vapors may accumulate in dwellings or occupied buildings to levels that may pose near-term safety hazards (e.g., explosion), acute health effects, or aesthetic problems (e.g., odors). The VI pathway is considered complete when the vapors move from the source (or groundwater contamination) through the deep soil and subsurface soil gas, and into a structure. Each of these components must exist in order for the pathway to be considered complete. It is possible for volatile compounds to impact deep and subsurface soil gas but still not impact indoor air. In this case the pathway would not be considered complete and no mitigation would be required. An investigation of the potential for VI should be performed in residential neighborhoods where groundwater VOC concentrations are above VI screening levels (see Attachment 1).

Ecological routes of exposure were also evaluated as a part of this FYR. The ecological review determined that there are potential ecological risks associated with discharge of groundwater COCs to the Rock River. Adverse ecological effects on benthic organisms cannot be ruled out with the available monitoring well information. Based on data for the monitoring wells close to the river, the COCs for potential ecological risk are 1,1,1-TCA and TCE. One additional COC, 1,1-DCE, was reported at the screening value in one well. An evaluation of the potential impacts within the Rock River is needed (see Attachment 2).

### ***Changes in Toxicity and Other Contaminant Characteristics***

There have been three updates to the toxicity factors for chemical COCs identified in the 2002 SERGWC ROD. The toxicity factor updates result in preliminary remediation goal (PRG) changes for two soil COCs; 1,1-DCE and 1,2-DCE (total), now 290 mg/L and 780 mg/L, respectively. Additionally, the toxicity factor for 1,2-DCE (total) in groundwater results in a new PRG of 0.07 mg/L to match the MCL for the lower of the two 1,2-DCE isomers. Updating the PRGs for these COCs does not result in any changes to the remedy or result in increased costs, however.

### ***Changes in Risk Assessment Methods***

Risk assessment methodologies have changed since the June 2002 ROD with respect to the VI pathway. Those changes are reflected in the evaluation of human health risk due to VI, as outlined in the section entitled "Changes in Exposure Pathways." The recommended evaluation of that potential pathway will be used to determine the protectiveness of the remedy. Additionally, the use of pore water measurements to evaluate ecological risks to water bodies from contaminant discharges has changed ecological risk methods. Pore water sampling of the Rock River is needed and is therefore included as a recommendation in this FYR.

### ***Expected Progress towards Meeting RAOs***

The progress of the SERGWC remedy towards meeting RAOs will be determined through the planned update to the groundwater model. Updating the groundwater model to evaluate the overall contaminant plume and source areas will confirm whether the remedies, as outlined in the 1995 and 2002 RODs, are meeting RAOs in a reasonable timeframe.

**Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

No other information, beyond what has been previously discussed in this FYR report, has come to light that could call into question the protectiveness of the remedy.

**Technical Assessment Summary**

The SERGWC site plume has now migrated to the Rock River and has also expanded laterally to beneath additional residential and commercial areas to the north and south, as shown in the revised plume map (see Figure 3). EPA, IEPA, and the city of Rockford are evaluating the new plume outline to identify any new homes and businesses within the plume that may have private wells for connection to the municipal water system. Some residents within the SERGWC plume area have, to-date, refused to hook up their homes to municipal water and are potentially being exposed to unacceptable health risks by drinking contaminated water. IEPA is developing an IC Work Plan that will include strategies for ultimately connecting those residents that still refuse to connect to municipal water.

Contaminant plume concentrations are dropping in many of the wells in the monitoring system although some monitoring well locations continue to see increases. Once all of the remedial actions are operating, EPA projects that the trend in COC concentrations in the entire downgradient monitoring well network will decline. The groundwater remedies for Source Areas 4 and 9/10 are operating as designed. Concentrations of site-related COCs are generally dropping in downgradient wells as the remedies continue to remove COCs from these Source Areas. Potential VI impacts to residents within the plume area must be evaluated to make sure that there are no long-term risks. Additionally, now that the SERGWC plume has reached the Rock River, ecological impacts to the river must be evaluated.



## VI. ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS

**Table 5:** Issues and Recommendations/Follow-up Actions

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
2	Several residents within the plume area have declined to hook up their homes to the municipal water supply and are potentially being exposed to unacceptable health risks if drinking contaminated water.	Continue to work towards connecting remaining targeted residences to the Rockford municipal water supply	EPA/IEPA /PRPs	EPA/ IEPA	12/31/2014	No	Yes
2	Potential indoor VI risks exist for residents living above the groundwater contaminant plume.	Conduct deep soil gas testing at residences in the plume area, evaluate results, and mitigate, if necessary	EPA/IEPA /PRPs	EPA/IEPA	5/15/2014	No	Yes
2	Contaminated groundwater discharging to the Rock River may be causing adverse effects to ecological receptors.	Perform a pore water study at the Rock River to determine the nature of any adverse effects on ecological receptors.	EPA/IEPA /PRPs	EPA/IEPA	5/15/2014	No	Yes
2,3	Certain institutional controls (ICs) need to be fully implemented to ensure long-term protectiveness of the remedy.	EPA and IEPA should prepare an Institutional Control Implementation and Assurance Plan (ICIAP) or similar IC plan for the site. The ICIAP should include the results of site ICs evaluation activity that has already been conducted and a plan for 1) future IC evaluation activity; 2) taking corrective measures to existing ICs, if needed; 3) placing additional ICs, if needed, and; 4) ensuring the long-term stewardship of the site, which includes on-going monitoring, maintenance, and enforcement of ICs.	EPA/IEPA	EPA/IEPA	9/26/2014	No	Yes

2	EPA and IEPA should determine whether monitored natural attenuation of the groundwater contaminant plume is protective over the long term.	EPA and IEPA should update the groundwater model once construction of all Source Area cleanup remedies is completed	EPA/IEPA	EPA/IEPA	5/15/2015	No	Yes
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## VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> <p>The remedy at OU 1 is protective of human health and the environment because all immediate exposure pathways that could result in unacceptable health risks are being controlled. A total of 264 residences with contaminated private wells were connected to Rockford's municipal water supply and the private wells were properly abandoned to ensure that the wells could not be used in the future. Additionally, an activated carbon treatment unit that was installed at Rockford Municipal Well 35 is effective in removing VOCs from pumped groundwater so that this well can now be used to supply clean drinking water during periods of peak demand. (Placement of ICs that prohibit the use of contaminated groundwater underneath the residences will be addressed under OU2.)</p>	

Protectiveness Statement(s)		
<i>Operable Unit:</i> OU2	<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date:</i> September 15, 2015
<i>Protectiveness Statement:</i> <p>A protectiveness determination at OU2 will be deferred until EPA obtains further information. EPA and IEPA will conduct a deep soil investigation to determine whether VI is impacting residential and commercial properties above the plume area. In addition, long-term ecological impacts to the Rock River will be studied to determine if ecological receptors are adversely impacted by the discharge of site-related contaminated groundwater into the river. Also, long-term protectiveness of the remedy for OU2 will require that residences over the plume area be connected to the city water supply or that institutional controls (ICs) be put into place to ensure that any residences within the plume area with owners that are refusing to hook up to city water will be connected in the future.</p>		

Protectiveness Statement(s)	
<i>Operable Unit:</i> OU3	<i>Protectiveness Determination:</i> Will be Protective
<i>Protectiveness Statement:</i> <p>Remedial actions at Source Areas 4, 7, and 11 have not yet been fully implemented. However, the Source Area remedies at OU3 are projected to be protective of human health and the environment upon their completion, along with the full implementation of site-wide ICs. Contaminants are present in subsurface soil, but under current conditions there is no potential for human exposure. Some ICs are in place to restrict groundwater usage within the source areas; in Source Area 7, an Environmental Restrictive Covenant covering soil and groundwater is in place. In a portion of Source Area 9/10, an Environmental Restrictive Covenant covering groundwater and land use is in place, but additional ICs are needed. Additional land-use restrictions may be needed at Source Areas 4, 7, and 11. When fully</p>	

implemented, the site-wide ICs will effectively limit the potential for exposure to contaminated groundwater at the OU3 source areas. Compliance with site-wide ICs will be ensured by implementing, monitoring, and maintaining effective ICs as well as maintaining the site remedy components. Long-term stewardship of ICs must be provided for.

## **VIII. NEXT REVIEW**

EPA will complete the next FYR of the SERGWC site five years from the completion date of this review.

## IX. APPENDIX A – EXISTING SITE INFORMATION

### SITE CHRONOLOGY

**Table 6:** Site Chronology

Event	Date
Initial discovery of problem or contamination	1981
Pre-NPL response: Municipal well shut down/well sampling	1982-89
Final NPL listing	March 1989
Removal actions: Municipal water to 283 residences	August 1989-91
RI/FS complete (OU1)	March 1991
ROD signature (OU1)	June 14, 1991
RD Complete (OU1)	June 1991
RA Complete (OU1): Add'l 264 residents to city water	December 1992
RI/FS complete for source area identification (OU2)	1994
ROD signature (OU2) Add'l 400 residents to city water, natural attenuation to restore contaminated aquifer	September 29, 1995
Additional Source Area investigation	1996-2000
CD for OU2: Rockford establishes groundwater monitoring network	1998
RA complete (OU2)	1999
CD with multiple PRPs for cost recovery/Area 7 Spec. Acct	1999, 2001
ROD signature (OU3) for source control remedies	June 11, 2002
CA signed with IEPA for state-lead at Source Areas 4,7, and 11	2002, 2006
AOC with HS for RD at Source Area 9/10	2003
Source Area 4 soil interim excavation complete	2005
RD completed by Hamilton Sundstrand (HS) for Source Area 9/10	2007
RD completed by IEPA for Source Area 4	2007
CD with HS for RA, Source Area 9/10	September 2, 2008
ESD: Soil excavation for Source Area 9/10	2009
RA Construction completion: Source Area 4 leachate	2010
ESD: Soil excavation for Source Area 7	2010
ESD ERH for Source Area 4 soil	2012
RA Construction completion: Source Area 9/10	February, 2013
RD Completion: Source Area 7	January 28, 2013
Previous five-year reviews	Jan. 1998, May 2003, and May 2008

## **X. BACKGROUND**

### **Physical Characteristics**

The SERGWC site is contained within an approximately 10 square mile area in the southeast portion of Rockford, Winnebago County, Illinois (see Figure 1). The topography is essentially flat-lying with gradual sloping toward the Rock River. There are approximately 600 homes/businesses in the immediate vicinity of the site. This approximately 10 square mile area is bounded by Harrison Avenue to the north, Sandy Hollow Road to the south, Mulford Road to the east and the Rock River to the west. Within this area are several groundwater contaminant plumes and the original boundary of the site was defined by the extent of groundwater contamination with concentrations of total volatile organic compounds (VOCs) above 10 micrograms per liter (ug/L or parts per billion (ppb)) (see Figure 2).

### **Hydrology**

The Source Area 4 subsurface is largely comprised of medium sand overlain by approximately five feet of silty topsoil. Groundwater is encountered at approximately 29 feet bgs. Groundwater in the unconsolidated sediments below Source Area 4 flows in a west-northwest direction.

The stratigraphy of Source Area 7 is characterized as a heterogeneous assemblage of unconsolidated and discontinuous sands, silts, and clays that overlie dolomite bedrock. This geology is consistent with reports of quarrying. An east-west trending buried bedrock valley roughly parallels the present-day creek valley. Groundwater flow in both the unconsolidated and bedrock aquifers is to the northwest, with localized discharge of shallow groundwater to the creek. Depth to groundwater ranges from about 75 feet at the south end of Source Area 7, to 36 feet south of the park, to 13 feet within the park to less than 2 feet near the creek. Depth to groundwater varies seasonally and is highly dependent on precipitation.

The geology of Source Area 9/10 and 11 is predominantly unconsolidated sand and gravel to a depth of at least 101 feet bgs. There is a 10 foot thick silt/clay layer at Source Area 11 at a depth of approximately 74 feet bgs. The water table is encountered at a depth of 20-25 feet in Source Area 11 and 30-35 feet in Source Area 9/10. Groundwater flow in Source Areas 9/10 is west to southwest and flow in Source Area 11 is to the southwest.

### **Land and Resource Use**

The land that comprises the SERGWC site is predominantly suburban residential, with scattered agricultural, industrial, retail and commercial operations. The residential areas are mixed with parks and other recreational facilities. Industrial property use ranges from light-manufacturing facilities up to large manufacturing operations. Commercial facilities include shopping facilities such as grocery stores and fast food restaurants. Churches and a community center are also located in the site area. Future uses of the entire area will likely remain the same as they are today.

Groundwater is the primary source of drinking water for the city of Rockford and Winnebago County. Because of the relative abundance of groundwater resources, the Rock River, to the west of the site, is not used as a drinking water source. IEPA estimates that about 600 residential homes within and adjacent to the site were, at one time, using private wells for drinking water. A smaller number of businesses with potable use wells were also present within the central portion of the site. Currently, with few exceptions, all residents and commercial properties within the SERGWC contaminated plume area are connected to the municipal water supply system.

A Winnebago County ordinance regulates groundwater use in the County by restricting new wells from being installed in areas where the groundwater is not safe to use. In addition, Winnebago County Code requires all properties located within 200 feet of a public water supply to connect to the water supply. Winnebago County Code also requires property owners to obtain a well permit for a new well or for well repairs. If contaminants are detected during private well sampling, the county can recommend that a home treatment unit be installed or that the new or redrilled wells be completed below the zone of contamination.

### **History of Contamination**

The remedial investigation at the SERGWC site that was conducted during 1993-94 identified four significant contaminant source areas: Source Area 4, Source Area 7, Source Area 9/10, and Source Area 11. At Source Area 7, hazardous wastes including chlorinated solvents, waste oils and fuels, paint sludges, tank bottoms, hospital wastes, and general refuse, were mostly disposed during the late 1950s to early 1960s. At Source Area 4, spills and discharges of recent, but unknown, age associated with the Swebco Manufacturing facility contributed to soil and groundwater contamination. Source Area 9/10 is primarily an industrial area, largely covered with concrete and asphalt. Hamilton Sundstrand Plant 1 occupies much of the northern half of this area and was the source of historical solvent spills. Releases of chlorinated VOCs have also occurred at the former Mid-States Industrial facility, the Nylint property, and the Rockford Products facility. Several spills and discharges of unknown age were identified at Source Area 11, the site of the former Rockford Varnish facility.

### **Initial Response**

Groundwater contaminated with volatile organic compounds (VOCs) was initially discovered by the city in 1981. As a result, four municipal wells in the plume area were taken out of service. In 1982, the city discovered that private residential wells were contaminated and closed additional city wells. Contamination of Municipal Well 35, located at Ken Rock Playground, was discovered during a routine sampling of the well in 1984; the well was tested for three priority pollutants and several VOCs were detected. Because contaminants were present at levels above the Safe Drinking Water Act Maximum Contaminant Levels (MCLs), Municipal Well 35 was taken out of service in 1985.

The IEPA confirmed that VOCs were present in city water in 1984, after receiving reports that plating wastes had been illegally disposed of in a private well. In October 1984, the Illinois Department of Public Health (IDPH) initiated a study that involved the sampling of



49 residential wells near the allegedly contaminated private well. Contaminants associated with plating wastes were not found in the study, but high levels of chlorinated solvents including 1,1,1 trichloroethane, trichloroethene, and tetrachloroethene, were found in many of the residential wells. Chlorinated solvents are commonly used in industries for degreasing machinery. The IDPH took an additional 337 water samples from residential wells between 1985 and 1989 to determine how many residential wells were affected by the groundwater contamination. The Illinois State Water Survey also performed a regional groundwater investigation between 1986 and 1988. This investigation also verified widespread residential and municipal well contamination. Several municipal wells owned by Rockford were closed as a result of groundwater contamination.

The SERGWC site was proposed for inclusion on the National Priorities List (NPL) on June 24, 1988 and was formally added to the NPL on March 31, 1989 as a state-lead, federally funded Superfund site.

In August 1989, EPA sampled 112 residential wells around the SERGWC site to determine if an immediate removal action was warranted. Based on the sampling results, EPA initiated a Superfund time critical removal action to place residents whose water wells had VOC levels equal to or greater than 25% of removal action levels under CERCLA, on bottled water as a temporary measure. In December 1989, the same residents received point-of-use carbon filters from EPA. Ultimately, EPA extended water mains and provided service connections for 283 residences as part of the removal action. This action was completed in 1991.

Because of the size and complexity of the groundwater contamination at the SERGWC site, the IEPA and EPA divided the site into operable units (OU). The SERGWC site consists of three operable units: OU1 (Drinking Water OU) which addresses drinking water contamination in residential wells; OU2 (Groundwater OU) which addresses the area-wide groundwater contamination beneath the site; and OU3 (Source Control OU) which addresses the four primary Source Areas (Source Areas 4, 7, 9/10, and 11) of the groundwater contamination.

EPA provides funding to IEPA to implement and oversee the cleanup at OU1 and OU2. In September 2002, EPA signed a Cooperative Agreement with IEPA which designated the IEPA the lead agency and in which EPA agreed to fund IEPA to conduct the RI/FS and the RD at the OU3 Source Areas 4, 7, 11. Under this agreement, EPA also funded IEPA to oversee the Potentially Responsible Party (PRP) design effort at Source Area 9/10.

### **Basis for Taking Action**

IEPA sampled approximately 117 wells as a part of an RI of the SERGWC area groundwater (OU2) to determine whether additional protections were needed beyond the completed removal actions. The human health risk assessment concluded that due to the identified presence of chlorinated VOCs, the ingestion of groundwater within the SERGWC plume area presented a significant risk to people using private wells for drinking water. A ROD for OU1 was signed June 14, 1991, which resulted in a total of 547 homes connecting to municipal water and their private wells being plugged and abandoned. In addition, a GAC unit was installed on Municipal Water Well 35, which was needed for the increased water demand.

An investigation of potential groundwater contamination sources at the SERGWC site was completed in January 1994, which included soil gas sampling, monitoring well installation and sampling, soil sampling, and residential air sampling.

At Source Area 4, subsurface investigation on the south, east, and north side of the former Swebco Manufacturing property indicated that the source of soil VOC contamination is the area beneath the parking lot. Elevated concentrations of soil vapor migrated eastward from the source area. An 8-foot thick LNAPL zone was also present at the water table in the source area. The estimated volume of contaminated soil was 30,000 cubic feet in Source Area 4, and the maximum observed soil concentration was 510,000 microgram per kilogram (ug/kg) of 1,1,1-TCA, the primary VOC contaminant in Source Area 4 soils.

The extent of VOC soil contamination in the northern part of Source Area 7 extends northward from the north end of Ekberg Park for a distance of approximately 150 feet. The vertical extent of contamination extends to a depth of 29 feet in the northern part of the park, based on the maximum depth of drilling. NAPL was found at a depth of about 26 feet in one boring, corresponding to 11 feet below the water table. The estimated volume of VOC-contaminated soil is 265,000 cubic yards in Source Area 7 and the maximum observed soil concentration was 875,450 ug/kg total VOCs. Surface water in the creek along the north boundary of Source Area 7 contained low levels of the same VOCs found in Source Area 7 soils, indicating that shallow groundwater from Source Area 7 was locally discharging to the creek; however, surface water samples collected upstream of Source Area 7 also showed impacts. Creek sediments were not showing impacts from VOCs.

Significant sources of chlorinated VOC contamination were present at Sundstrand Plant #1, based on soil and groundwater data that show little or no contamination on the up gradient side of the plant and elevated concentrations on the down gradient side. Elevated 1,1,1-TCA concentrations in groundwater downgradient of Sundstrand indicated the possible presence of NAPL because the aqueous solubility limit of 1,1,1-TCA exceeded one percent.

Sampling determined that soil contamination in Source Area 11 is dominated by the aromatic VOCs, ethylbenzene, toluene, and xylene (ETX), which are primarily located in the uppermost part of the saturated zone. This zone of ETX contamination extends from the east edge of the above-ground storage tank area west to 11th Street, based on soil samples collected during the RI investigation. In addition, significant ETX contamination was found at the northwest portion of the Rohr Manufacturing building, extending the area of known contamination 150 feet northward. It is likely that elevated ETX concentrations exist beneath the west end of the Rohr building. Chlorinated VOCs were present in Source Area 11 soils, however elevated detection limits (>10,000 ug/kg) caused by high ETX concentrations prevent an accurate determination of chlorinated VOC concentrations.

A human health risk assessment was conducted for all four source areas of the SERGWC site utilizing the IEPA Tiered Approach to Corrective Action Objectives (TACO) rules. The risk assessment evaluated the following exposure pathways at each source area: 1) direct contact with soil, 2) chemicals transferring from soil to groundwater, and 3) ingestion of vegetables grown in soil, for Source Area 7 only, because portions of this area were used for agricultural purposes. The major COCs for soil and groundwater and their PRGs are identified in Table 7. The risk assessment identified conditions at all four source areas that constituted potential or

actual threats to human health or the environment. Concentrations of contaminants present in the soil at Source Areas 4, 7, and 11 exist at levels that were not protective of human health for groundwater consumption. The risk assessment also identified soils at Source Area 7 that exceeded direct contact PRGs for TCE and PCE. Although no soil samples were obtained at Source Area 9/10 that had concentrations above PRGs, groundwater concentrations beneath Source Area 9/10 were as high as 12 mg/L for 1,1,1-TCA, indicating possible NAPL, a principal threat. The risk assessment also concluded that concentrations of contaminants in soil at Source Area 4 existed at levels that were not protective of human health via the direct contact exposure pathway. In cases where the site concentration exceeds levels protective of human health and the environment, risks to human health are considered unacceptable.

Groundwater investigations performed at the time of the risk assessment indicated that site-related groundwater contaminants were not adversely impacting the Rock River. Groundwater modeling indicated that even without remediation, VOC concentrations in groundwater would not exceed surface water criteria. Endangered species were not identified at any of the source areas.

Indoor and outdoor air quality monitoring was initially performed in 1993 to assess the potential for VI in the homes in Source Areas 4 and 7. The assessment concluded that indoor air was a potential pathway of concern at Source Area 4 but not at Source Area 7. Residential air sampling was conducted in indoor air of homes within Source Area 4 and 7 during the OU2 RI. The 1995 OU2 RI Report concluded that all chemicals detected in residential homes were below health-based air guidelines available at the time and that indoor air concentrations could not be directly correlated with groundwater contamination. Because the majority of the indoor air samples with significant detections were those taken from sump pits in basements of homes in Source Area 4, IDPH recommended that the pits be filled to limit potential exposure. Contact with the owners of homes with sump pits indicated that many had taken the advice of IDPH and filled the pits. Indoor air sampling was not conducted in Source Areas 9/10 and 11 because these areas are primarily industrial/ commercial and because soil gas concentrations near homes were low.

**Table 7:** COCs and PRGs as identified in the SERGWC Site June 2002 ROD

Media	COC	PRG (Soil: mg/kg) (GW: mg/L)	Reference	Source Area
Soil	1,1-DCE	0.06	TACO Tier 1 Protect GW	7, 9/10
Soil	1,1-DCE	700	TACO Tier 1 Contact	7
Soil	1,2-DCA	0.02	TACO Tier 1 Protect GW	9/10
Soil	1,2-DCE (total)	0.4	TACO Tier 1 Protect GW	9/10
Soil	1,2-DCE (total)	1200	TACO Tier 1 Contact	7
Soil	1,2-DCE (total)	0.941	TACO Eq R-15	7
Soil	Benzene	0.189	TACO Eq R-15	11
Soil	Ethylbenzene	13	TACO Tier 1 Protect GW	9/10
Soil	Ethylbenzene	7.983	TACO Eq R-15	11
Soil	Xylenes (total)	410	TACO Tier 1 Contact	7
Soil	Xylenes (total)	119	TACO Eq R-15	7

Soil	Xylenes (total)	312	TACO Eq R-15 Sat. Limit	11
Soil	Toluene	638	TACO Eq R-15 Sat. Limit	11
Soil	DCM	0.02	TACO Tier 1 Protect GW	9/10
Soil	PCE	0.06	TACO Tier 1 Protect GW	9/10
Soil	PCE	11	TACO Tier 1 Contact	7
Soil	PCE	1.465	TACO Eq R-15	7
Soil	1,1,1-TCA	2.0	TACO Tier 1 Protect GW	9/10
Soil	1,1,1-TCA	1200	TACO Tier 1 Contact	7
Soil	1,1,1-TCA	108,033	TACO Eq R-15	7
Soil	1,1,1-TCA	9.118	TACO Eq R-15	4
Soil	1,1,2-TCA	0.02	TACO Tier 1 Protect GW	9/10
Soil	TCE	0.06	TACO Tier 1 Protect GW	9/10
Soil	TCE	5	TACO Tier 1 Contact	7
Soil	TCE	0.31	TACO Eq R-15	7
Soil	TCE	0.051	TACO Eq R-15	11
Soil	Vinyl chloride	0.01	TACO Tier 1 Protect GW	9/10
Soil	Beryllium	1.51	UTL on background	9/10
Soil	Benzo(a)anthracene	0.9	TACO Tier 1 Contact	9/10
Soil	Benzo(b)Fluoranthene	0.9	TACO Tier 1 Contact	9/10
Soil	Benzo(a)pyrene	0.3	Site specific background	9/10
Soil	Indeno(1,2,3-cd)pyrene	0.9	TACO Tier 1 Contact	9/10
Groundwater	1,1-DCE	0.007	MCL	7, 9/10
Groundwater	1,2-DCA	0.005	MCL	9/10
Groundwater	1,2-DCE (total)	0.17	Using <i>cis</i> -1,2 DCE MCL	7
Groundwater	Benzene	0.005	MCL	11
Groundwater	Ethylbenzene	0.7	MCL	9/10, 11
Groundwater	Toluene	1.0	MCL	9/10, 11
Groundwater	Xylenes (total)	10.0	MCL	7, 11
Groundwater	PCE	0.005	MCL	7, 9/10
Groundwater	1,1,1-TCA	0.2	MCL	4, 7, 9/10
Groundwater	1,1,2-TCA	0.005	MCL	9/10
Groundwater	TCE	0.005	MCL	7, 9/10, 11
Groundwater	Vinyl chloride	0.002	MCL	9/10, 11
Groundwater	DCM	0.005	MCL	9/10
Groundwater	Beryllium	0.004	MCL	9/10

## **REMEDIAL ACTIONS**

### **Remedy Selection**

The goal for OU1 was to provide bottled water to residents that were using private wells to address immediate health risks. Next was the provision of a permanent clean, alternative source of drinking water by connecting affected homes/businesses to city water. OU2 identified additional homes/businesses with impacted private wells and investigated cleanup options for site-contaminated groundwater. The goal of OU3 was to clean up the four primary groundwater contaminant source areas; restore contaminated groundwater to drinking water standards within a reasonable period of time; and control further migration of groundwater contamination beyond its current extent. Cleanup remedies selected in the OU1, OU2, and OU3 RODs and their corresponding cleanup objectives are discussed below.

### **Operable Unit 1**

Based upon the results of the OU1 RI/FS, EPA signed the first ROD on June 14, 1991. The remedial action objective in the OU1 ROD was to eliminate risks associated with exposure of the contaminated groundwater to residents of the Southeast Rockford area that use private wells for drinking water. The remedy for OU1 was an interim action remedy that addressed immediate health threats by providing clean, alternative drinking water supplies to affected residents. The remediation of the contaminated plume and source areas responsible for the contamination would be addressed in the later RODs.

The major components of the OU1 remedy selected in the 1991 ROD included:

- Construction of new water mains within targeted areas where no water mains existed and connection of these water mains to the city of Rockford water distribution system;
- Installation of service connections between the new water mains and affected residences which do not currently have access to municipal water;
- Installation of service connections between the new water mains and affected residences that already have water mains but are not connected to municipal water;
- Treating water pumped from Rockford Municipal Well 35 with granular activated carbon to achieve drinking water standards (this well only to be utilized during peak demand hours); and
- Abandonment of existing private wells at residences that received hook-ups to city water.

### **Operable Unit 2**

Based upon the results of the OU2 RI/FS, IEPA and EPA signed the OU2 ROD on September 20, 1995. The RAOs of the OU2 ROD were to eliminate the risks to human health and the environment by preventing exposure to groundwater contaminants; restore contaminated groundwater to drinking water standards within a reasonable period of time; and control further migration of groundwater contamination beyond its current extent. Cleanup goals for groundwater were the federal MCLs. The major components of the OU2

ROD that address exposures to groundwater contamination included:

- City water main extensions;
- Groundwater Monitoring for 205 years;
- Water service connections to selected homes and businesses projected to have combined concentrations of 1,1,1,-TCA and 1,1,-Dichloroethane (1,1-DCA) at levels of 5 ppb or greater;
- Future water service connections to selected homes and businesses (if necessary);
- Future source control measures at the primary source areas responsible for the contamination;
- Continued use of granular activated carbon treatment at Rockford Municipal Well 35; and
- Institutional controls (restrict public usage of, and therefore exposure to, site-related contaminated groundwater).

Although source control measures were a component of the OU2 ROD, the ROD stated that source control measures would be evaluated in the OU3 ROD.

Major components of the ROD that deal with management of groundwater migration included:

- Usage of natural processes (natural attenuation) to restore the groundwater to MCLs throughout the aquifer;
- Presumption that source control measures would be undertaken to reduce loadings to groundwater system, and reduce time required from 300 (without source control) to 200 years for achievement of goals;
- Institutional controls to curtail land use and opportunity for drinking water well installation down gradient of the site. Supplementing such controls is a local ordinance which requires issuance of a groundwater well permit before installation of any new drinking water well in an area of environmental degradation;
- Implementation of a long-term groundwater monitoring program designed to track horizontal and vertical extent of contaminated groundwater plume boundaries, monitor changes in chemical constituents and concentrations, and collect data to confirm that intrinsic biodegradation is occurring. The monitoring program consists of existing and new monitoring wells that monitors any expansion of the plume toward new or existing water supply wells; and
- Activated carbon treatment at Municipal Well 35.

### **Operable Unit 3**

Based upon the results of the OU3 RI/FS, EPA signed an OU3 ROD on June 11, 2002. The RAOs of the OU3 ROD were to:

- prevent dermal contact and ingestion of soil
- prevent inhalation of airborne contaminants in soil that exceed state or federal health-based levels or pose a threat to human health; and
- prevent further migration of contamination from the source areas to the underlying aquifer.

Source Area 7, because it contained a park, a creek, and agricultural area, had the following additional remedial objectives:

- prevent the public from direct contact with and ingestion of surface water or home-grown vegetables near the park containing contamination in excess of state or federal standards or that poses a threat to human health or the environment.

The OU3 ROD addressed the cleanup of soil and leachate (dissolved or suspended COCs within groundwater that originate in contaminated soils) at Source Areas 4, 9/10, and 11, thought to be responsible for the groundwater contamination. Soil remedies in the ROD consisted of either low-temperature thermal desorption or soil vapor extraction measures. Cleanup goals for soils and groundwater were established using the State of Illinois TACO regulations. Cleanup goals for ingestion of vegetables was established outside of TACO but using an approach approved by IEPA and EPA. The leachate remedy consisted of:

- the establishment of GMZs in the identified source areas,
- monitoring, and
- either limited extraction pumping to achieve on-site containment of the plume plus treatment of collected water, air sparging, or other related enhancement that would supplement soil vapor extraction measures.

In the case of Source Area 9/10, the need to invoke the contingent remedy in the OU3 ROD was dependent upon the presence of free product, the presence of NAPLs, and relative success of soil remedy. Cleanup goals for leachate are federal MCLs that must be met at the GMZ boundary.

ICs to restrict public usage of (and therefore exposure to) site-related contaminated groundwater are required by the OU3 ROD. The forms of ICs include curtailing certain land uses like residential, in some source areas as appropriate and preventing drinking water well installation down gradient of the site. As previously discussed, Environmental Restrictive Covenants are in place in Source Areas 7 and 9/10. The major components of the selected remedial actions for the OU3 source areas are shown in Table 8.

**Table 8: Selected Remedial Actions for Source Areas 4, 7, 9/10, and 11**

Source	Selected Remedy
Source Area 4	<ul style="list-style-type: none"><li>• Soil excavation followed by on-site low temperature thermal</li><li>• desorption with afterburner for gaseous emission control;</li><li>• Hydraulic containment; and</li><li>• Institutional Controls</li></ul>
Source Area 7	<ul style="list-style-type: none"><li>• A combination of soil vapor extraction (SVE) and air sparging system; with vapors thus collected treated via catalytic oxidation;</li><li>• Air sparging, to supplement SVE, would be conducted in shallower portions of the saturated zone. Air sparging wells may be about 50' in depth;</li><li>• Multiphase extraction (MPE) system with air stripper usage to manage collected VOCs. Subsequent surface water discharge to a nearby creek is then expected;</li><li>• Hydraulic containment; and</li><li>• Institutional Controls</li></ul>
Source Area 9/10	<ul style="list-style-type: none"><li>• Soil vapor extraction and enhanced air sparging with activated carbon treatment to treat leachate;</li><li>• Contingent remedy if DNAPLs are discovered in groundwater or if concentrations in groundwater are not decreasing after implementation of SVE; and</li><li>• Institutional Controls</li></ul>
Source Area 11	<ul style="list-style-type: none"><li>• Soil vapor extraction wells with vapor emissions treatment using catalytic oxidation;</li><li>• No action (with monitoring); and</li><li>• Institutional Controls</li></ul>

### **Remedy Implementation**

#### Operable Unit 1

Construction of the OU1 remedy began in July 1991 and was completed in July 1992. By November 1991, a total of 547 residential homes were hooked-up to the city of Rockford's municipal water. Construction of the Granular Activated Carbon (GAC) treatment building at Municipal Well 35 to treat water to drinking water standards was completed in April 1998. In December 1992, EPA issued a Remedial Action Report certifying that OU1 remedy was operational and functional. The OU1 remedy continues to be operational and functional. The OU1 ROD required no ICs because the OU1 remedy addressed immediate, not the long-term, health threats posed by drinking contaminated groundwater.

#### Operable Unit 2

In the January 1998 Consent Decree signed with EPA and IEPA, the city of Rockford agreed



to maintain, install and expand its water main service and hook-ups to homes and businesses within the site, and to commence long-term monitoring well network sampling and analysis. The city of Rockford also agreed, in the later amended Consent Decree, to pay (on behalf of generator and owner/operator covenant beneficiary parties) EPA and State of Illinois past costs related to the site.

The remedial action at OU2 is complete. The portion of the OU2 remedy that dealt with water main extensions was completed in April 1998, connecting approximately 264 affected homes/businesses to city water. Quarterly groundwater sampling from Municipal Well 35 shows that VOC concentrations in groundwater are below the MCL. Despite attempts by the City, the County Health Department, EPA, and IEPA, four known residents continue to refuse hook-ups to city water. EPA and IEPA will continue to work with the City and County toward the eventual closure of all private wells located within the plume area and to connect those residents and businesses to municipal water.

Groundwater monitoring well construction associated with the OU2 remedy began in December 1998 and was completed in March 1999. Since 1999, the City has collected groundwater samples from 35 monitoring wells on a semi-annual basis and reported its findings to IEPA and EPA. Figure 4 shows the groundwater monitoring well network locations. Total VOC concentrations in groundwater have generally decreased since 1999, with the exception of monitoring locations down gradient of Source Area 7 and some wells located near the Rock River. It is expected that total VOC concentrations in all wells will begin to decrease once all of the source area remedies are implemented. Natural attenuation of the groundwater may be occurring across the SERGWC site based on the ratio of parent VOC concentrations with associated break down product concentrations.

In September 1999, the city of Rockford submitted a Remedial Action Report certifying that the groundwater monitoring well network and GAC components of the OU2 remedy are operational and functional. Based on the EPA October 2012 site inspection, the OU2 remedy continues to be operational and functional.

### Operable Unit 3

Through the September 2002 Cooperative Agreement, EPA funded IEPA to conduct an RI/FS, and RD for Source Areas 4, 7, and 11. The cooperative agreement also provided funding to IEPA to conduct the RI/FS and provide oversight of the PRP-lead RD at Source Area 9/10. An interim soil removal of highly contaminated surface soil was conducted at Source Area 4 in September 2005 to eliminate the direct contact exposure route.

HS completed the design phase for their portion of Source Area 9/10 in April 2007.

### **System Operation/Operation and Maintenance**

As previously stated, currently O&M is limited to the long-term monitoring and maintenance activities performed by the city of Rockford and the O&M performed for the Source Area 9/10 groundwater/soil remedy. The Source Area 4 groundwater remedy is in LTRA for a period of ten years. Long term O&M for the Source Area 4 remedy will begin in 2020. A ten-year period

of LTRA is also anticipated for the Source Area 11. O&M is anticipated for Source Area 7 once RA is complete.

The city of Rockford is conducting the long-term monitoring and maintenance activities in accordance with the OU1 O&M plan written by the IEPA and approved by EPA in December 1992. The primary activities associated with O&M at OU1 include:

- Maintenance and repair of all water main extensions provided to residents;
- Inspection, maintenance and repair of all associated fixtures on the City right-of-way property (e.g., fire hydrants, valves, etc.);
- Inspection, maintenance and repair of the GAC treatment unit at Municipal Well 35;
- Water quality sampling of plant influent and effluent; and
- Analysis of the carbon absorber train influent and effluent.

Rockford also conducts the long-term monitoring and maintenance activities related to the groundwater monitoring well network portion of the OU2 remedy in accordance with the O&M plan approved by IEPA and EPA in December 1992.

The primary activities associated with O&M at OU2 include:

- Inspection, maintenance and repair or replacement of 34 monitoring wells that comprise the monitoring well network;
- Semi-annual sampling of groundwater monitoring well network;
- Inspection, maintenance and repair or replacement of the GAC treatment unit at Municipal Well 35; and
- Characterization and off-site disposal of spent GAC media;

HS conducts the long-term O&M requirements for their portion of the Source Area 9/10 groundwater/soil remedy according to O&M plans approved by EPA and IEPA. O&M for this portion of Source Area 9/10 includes:

- Inspection, maintenance, and repair of soil vapor extraction and air sparge wells;
- Inspection, maintenance, and repair of electrical and system controls
- Inspection, maintenance, and repair of piping, fittings, compressor, and blower
- Groundwater Management Zone monitoring
- Engineered barrier inspection
- Safety and security considerations for O&M

The projected annual O&M costs for SERGWC remedies, as detailed in the June 2002 ROD are as follows:

- city of Rockford monitoring well network: \$65,000
- Source Area 4 leachate remedy: \$47,000
- Source Area 7 multi-phase extraction remedy: \$448,000
- Source Area 9/10 AS/SVE remedy: \$329,000
- Source Area 11 MNA remedy: \$62,000

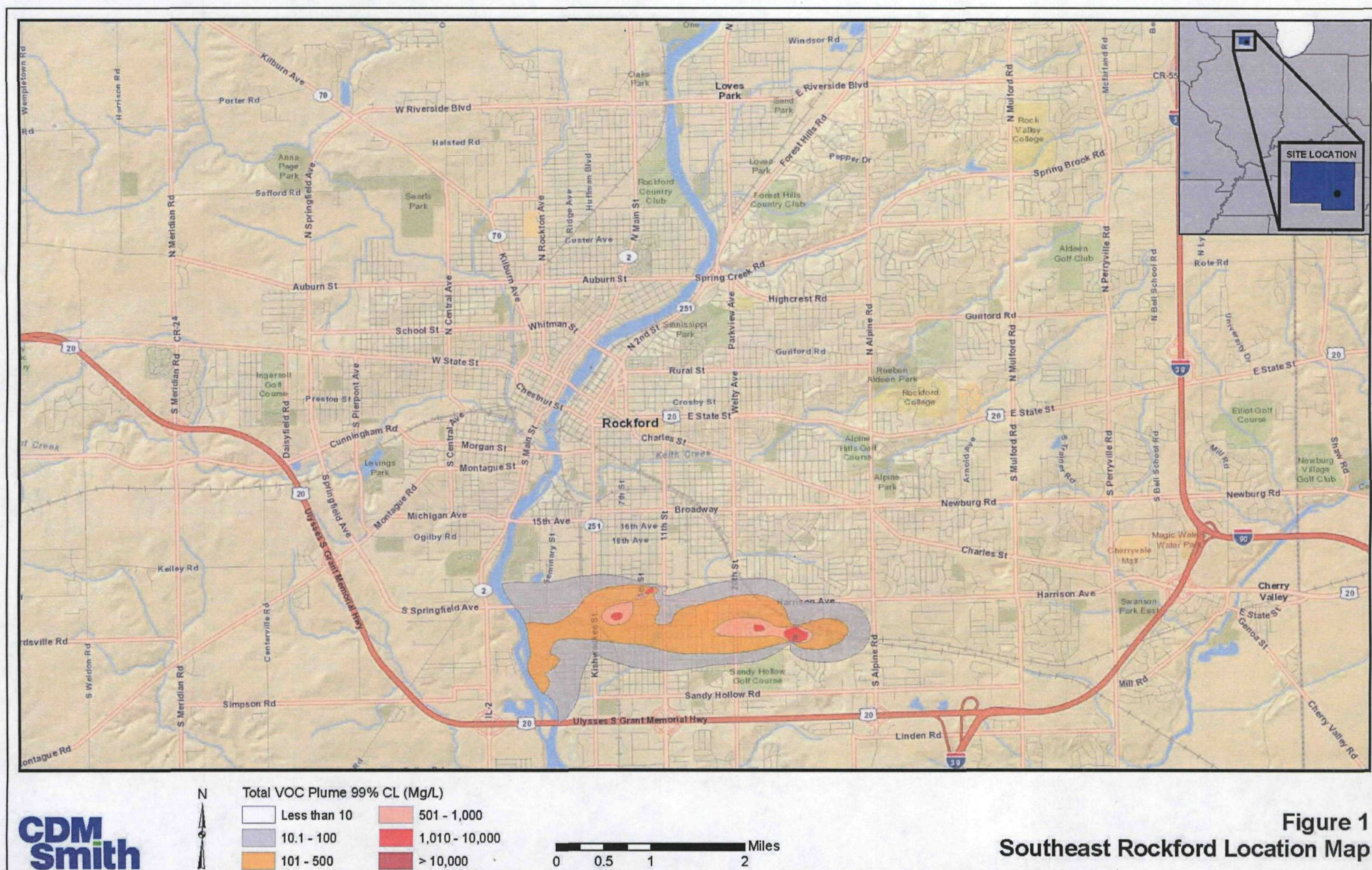
**Table 9: Actual O&M Costs**

OU	Source Area	Item	2008	2009	2010	2011	2012
2: City	NA	Project Mgmt	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
2: City	NA	Technical Services	\$29,615	\$30,450	\$30,450	\$29,950	\$29,450
2: City	NA	Repairs, materials					
3	4	Project Mgmt			\$7500	\$23,600	\$28,900
3	4	Technical Services					
3	4	Repairs, materials			\$63,200	\$234,200	\$185,800
3	4	Sampling				\$140,200	\$102,600

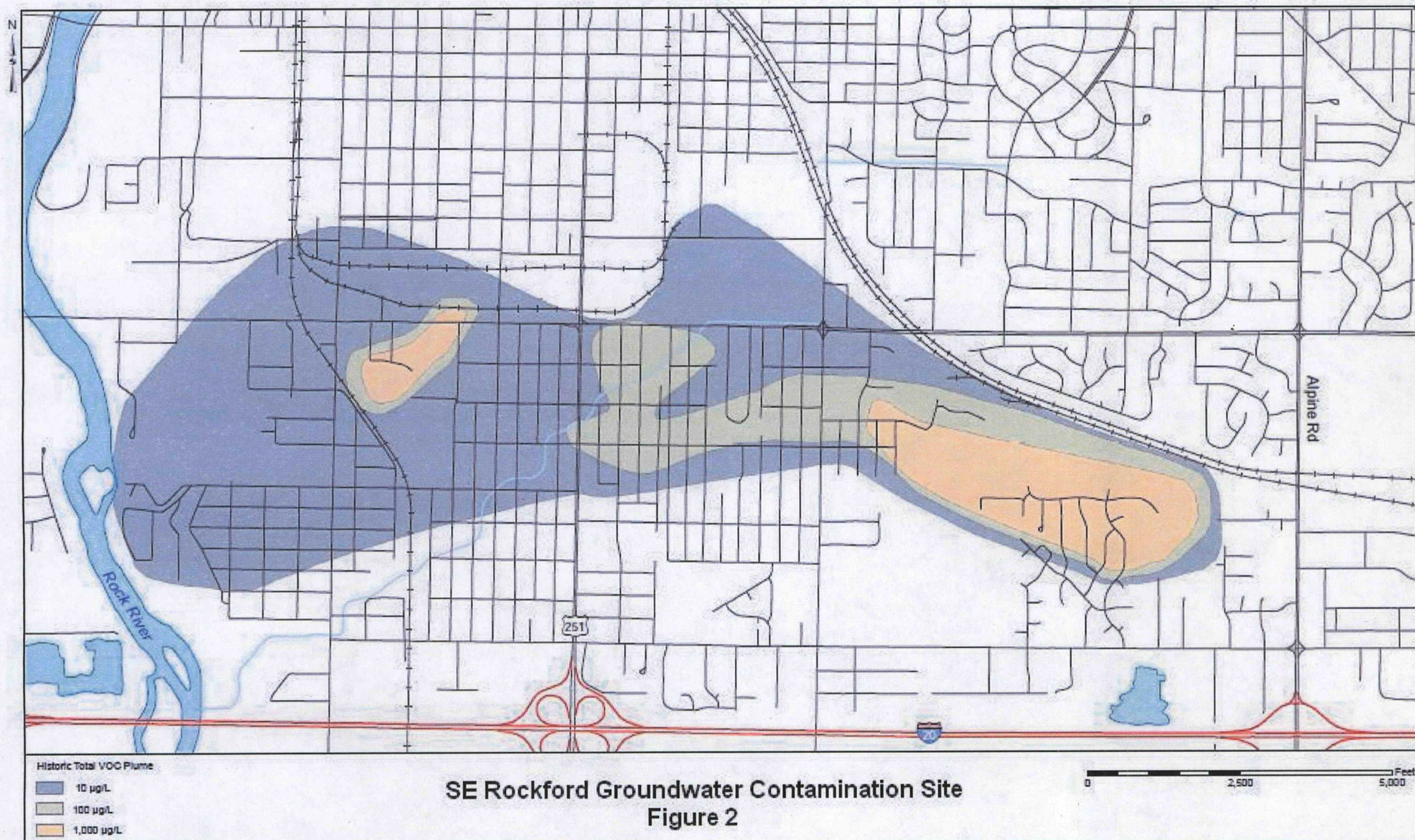
A comparison of the projected O&M costs versus the actual costs for the natural attenuation remedy implemented by the city of Rockford show that the estimates were above the actual costs for all five years since the last FYR. Costs associated with O&M for Source Area 9/10 were not shared by HS for this FYR. However, EPA was told by the HS project manager that annual costs, to-date, are close to the estimates detailed in the June 2002 ROD. A comparison of the estimated costs for O&M at Source Area 4, however, show that the actual O&M costs are approximately six times the amount estimated in the 2002 ROD.

**XI. APPENDIX B – ADDITIONAL MAPS, DATA, FIGURES, OR TABLES FOR  
REFERENCE**

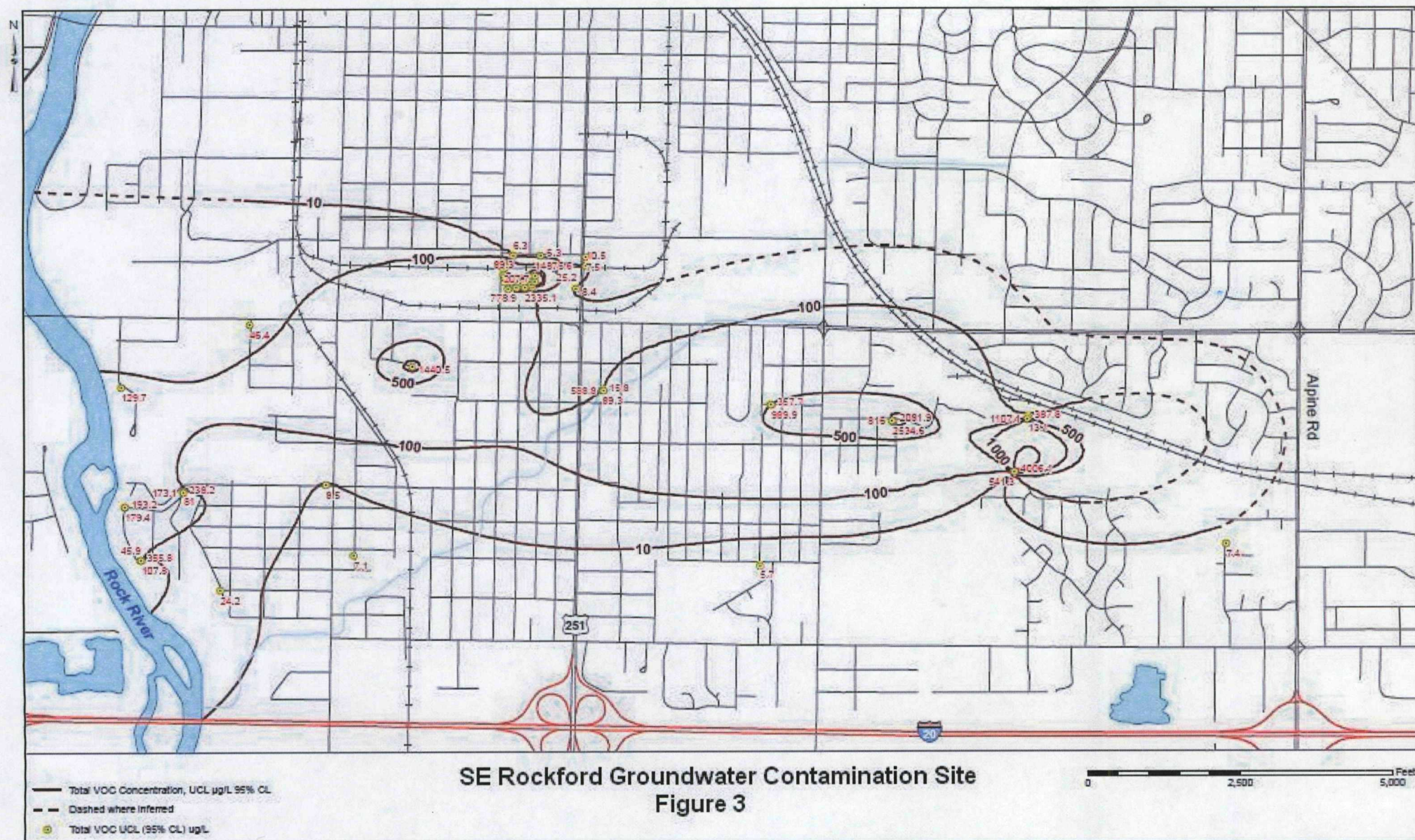






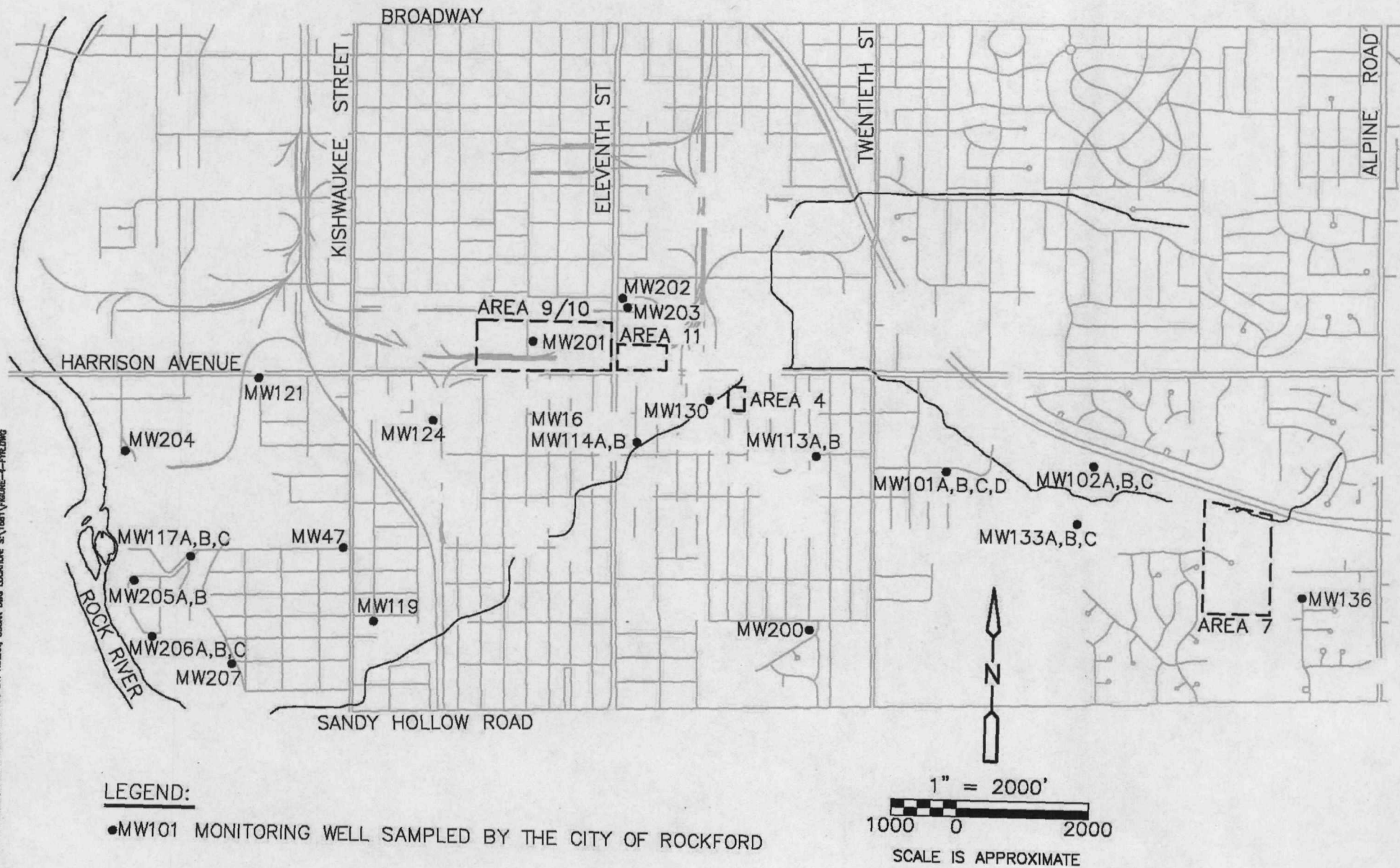








Plot Date: 4/17/2013 2:16 AM Plotted By: Roman, Oscar DWG Location: S:\1681\FIGURE-4-PR.DWG

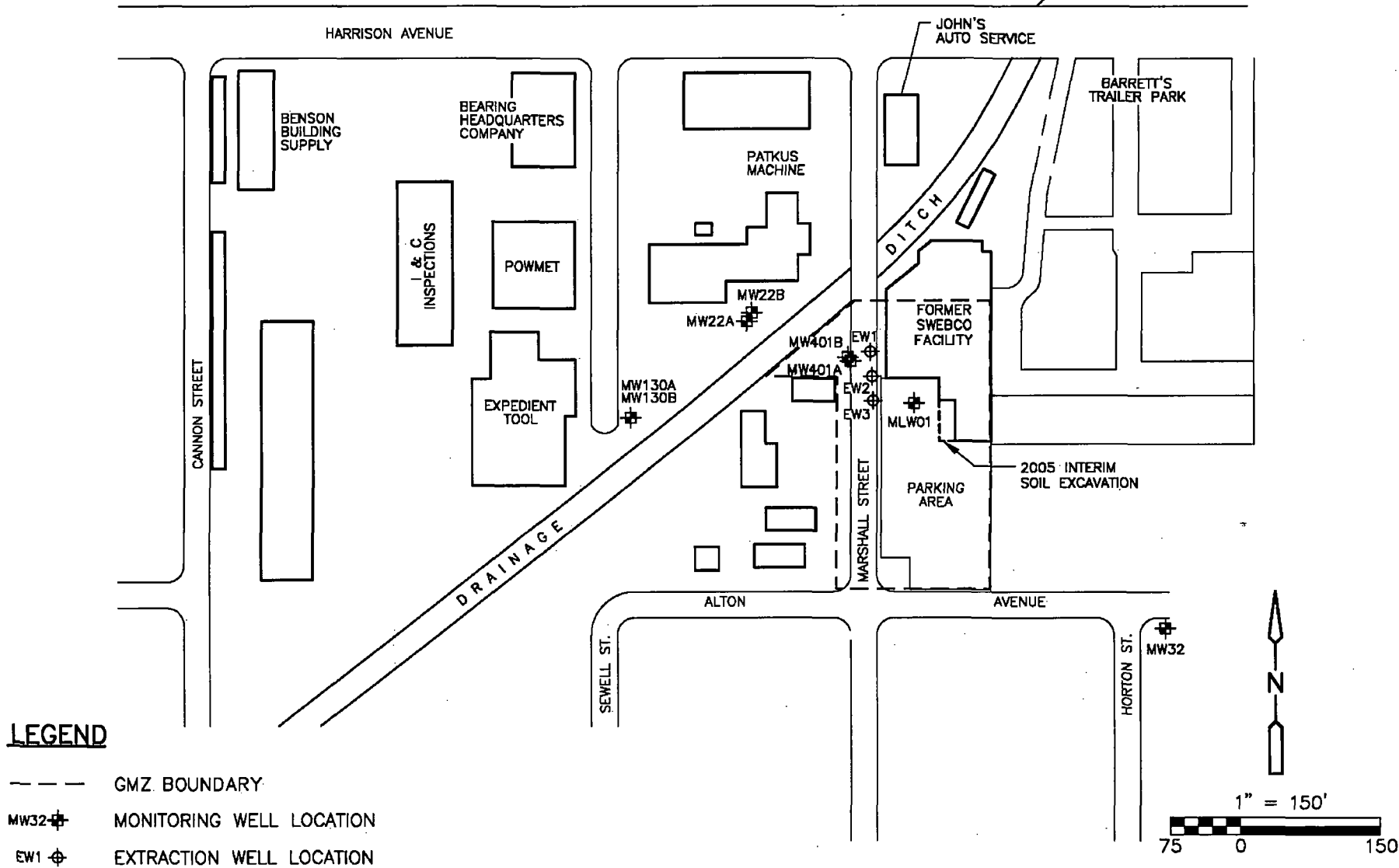


**CDM  
Smith**

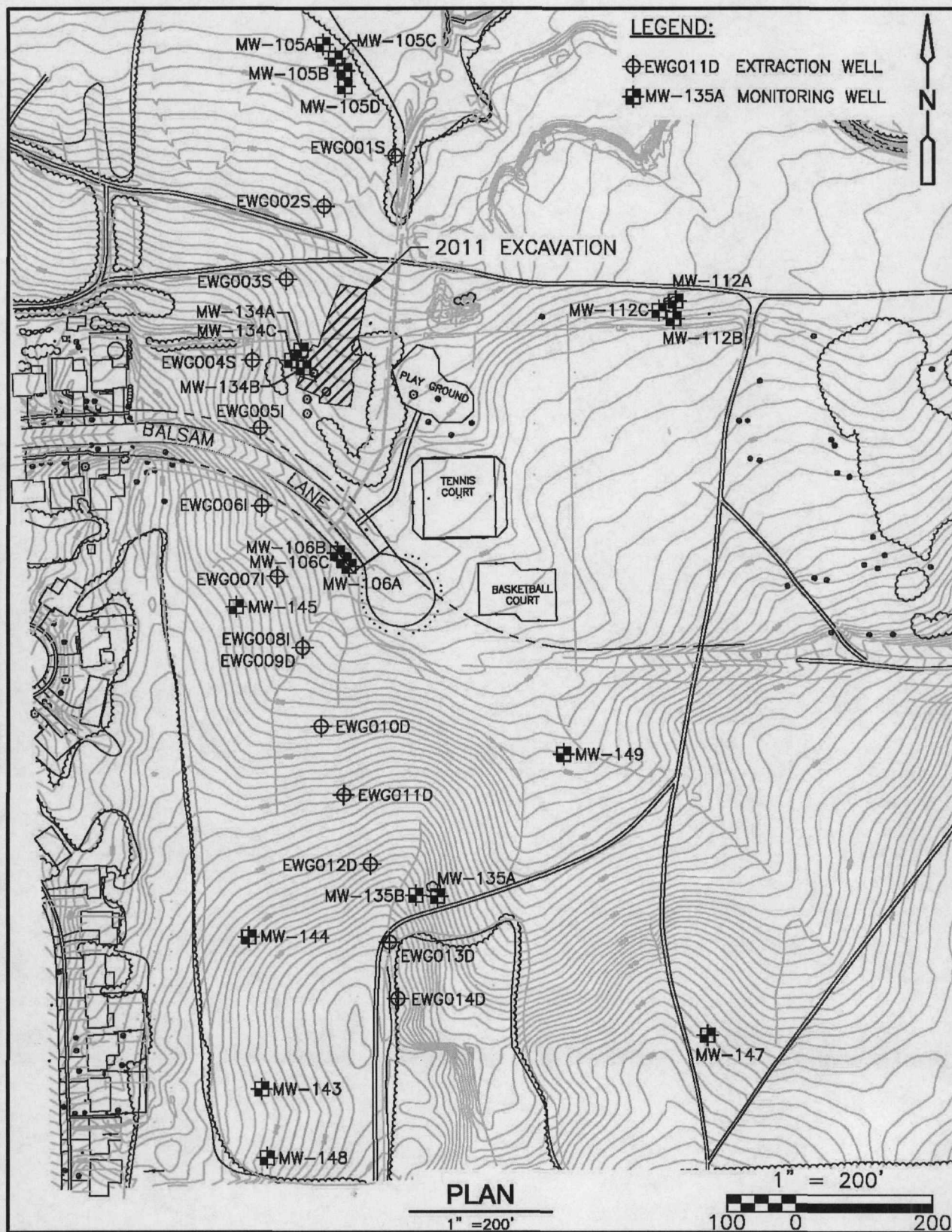
**FIGURE 4**  
**CITY OF ROCKFORD MONITORING WELL NETWORK**



PLOT DATE: 4/17/2013 1:36 AM PLOTTED BY: ROMAN, OSCAR DWG LOCATION: S:\1691\77224\_Area4-GMZ\FIGURE-5-FYR.dwg



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**CDM  
Smith**

**FIGURE 6  
SOURCE AREA 7**

PLOT DATE: 4/17/2013 2:00 AM PLOTTED BY: ROMAN, OSCAR DWG LOCATION: S:\1681\FIGURE-7-FYR.dwg

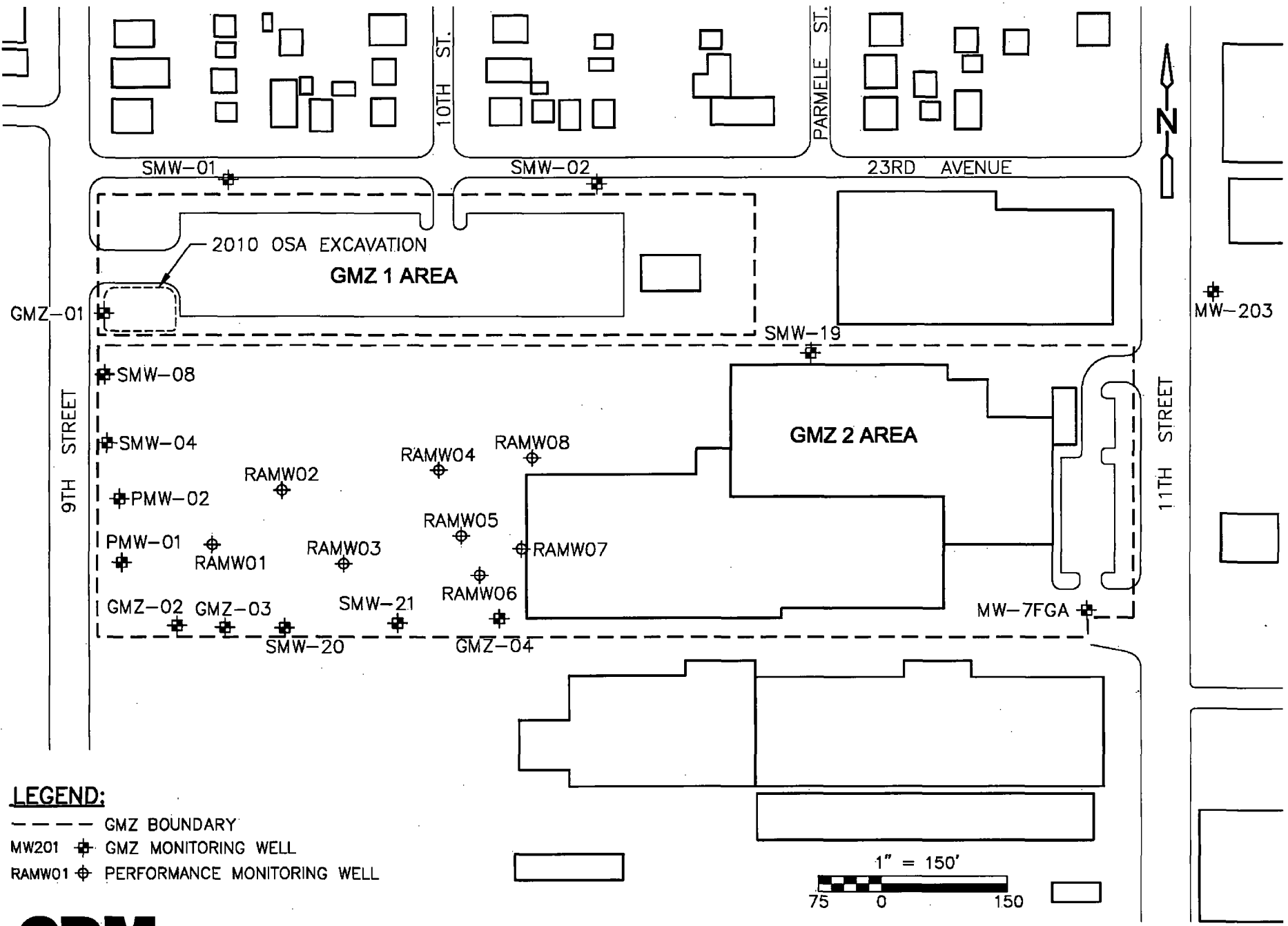
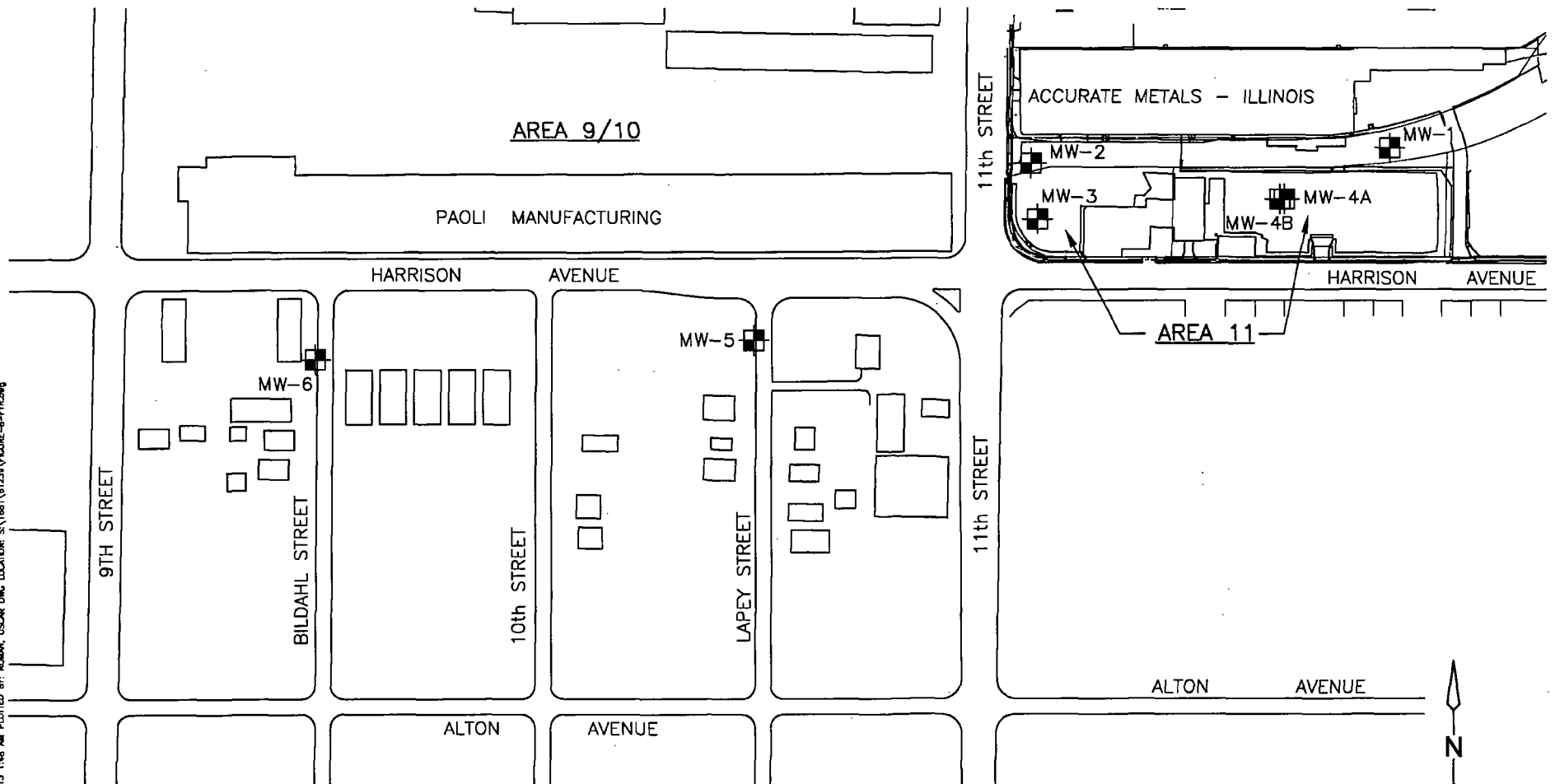


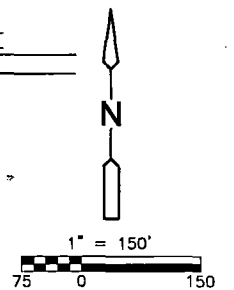
FIGURE 7  
SOURCE AREA 9/10

PLOT DATE: 4/17/2013 1:48 AM PLOTTED BY: ROMAN, OSCAR DWG LOCATION: S:\1891\81235\FIGURE-8-FTR.dwg



**LEGEND**

■ MW-3 MONITORING WELL LOCATION



**FIGURE 8**  
**SOURCE AREA 11**

**CDM**  
**Smith**



Invoice Number: 118518  
Order Number: 331131  
Client Name: Tetra Tech EM Inc.  
Ad: Rockford GW, Begins Review  
Publication: Rockford Register Star  
Run dates: Oct 03 2012



## **EPA Begins Review Of the Southeast Rockford Groundwater Superfund Site**

Rockford, Illinois

The U.S. Environmental Protection Agency, with assistance from the Illinois Environmental Protection Agency, is conducting a five-year review of the Southeast Rockford Groundwater Superfund site in the southeast portion of Rockford, Illinois. The Superfund law requires regular checkups of sites that have been cleaned up - with waste managed on-site - to make sure the cleanup continues to protect people and the environment. This is the fourth five-year review of this site.

U.S. EPA and Illinois EPA's actions to manage solvent contamination of groundwater at the site included providing municipal water to residents in the polluted area and ongoing actions to deal with four source areas of groundwater contamination.

More information is available at the Rockford Public Library- Main Branch, 215 N. Wyman Street, Rockford, and at [www.epa.gov/region5/cleanup/serockford](http://www.epa.gov/region5/cleanup/serockford). The review should be completed by May 2013.

The five-year review is an opportunity for you to tell U.S. EPA and Illinois EPA about site conditions and any concerns you have. Contact:

**Mike Joyce, U.S. EPA**  
Community Involvement  
Coordinator  
312-353-5546  
[joyce:mike@epa.gov](mailto:joyce:mike@epa.gov)

**Tim Drexler, U.S. EPA**  
Remedial Project Manager  
312-353-4367  
[drexler.timothy@epa.gov](mailto:drexler.timothy@epa.gov)

**Doyle Wilson, Illinois EPA**  
Remedial Project Manager  
217-782-7592  
[doyle.wilson@illinois.gov](mailto:doyle.wilson@illinois.gov)

You may also call U.S. EPA toll-free at 800-621-8431, 8:30 a.m. to 4:30 p.m., weekdays.

15-FTS000045317

Southeast Rockford Groundwater Contamination Site  
Site Interviews

Mr. Scott Moyer, Manager Remediation  
United Technologies Corporation  
Source Area 9/10  
January 29, 1013  
Email interview

- 1) Successes/problems in the implementation of ICs  
The IC's were recorded without incident on the required parcels identified in the CD/SOW and Groundwater Management Zones.
- 2) Successes/problems with the construction of the remedy and/or O&M  
The construction of the Phase 1 and Phase 2 AS/SVE systems were fairly routine as this type of remedy is fairly common in the remediation industry and is also recognized as a "presumptive" remedy. Installing the AS/SVE points, and RAM wells, were difficult at times due to the existing concrete cap thickness (engineered barrier IC). Excavation limits of the OSA were at times limited due to existing municipal utilities. In-situ treatment of HRC-X was introduced to OSA excavation sidewalls where levels of COCs were elevated, this exercise provided addition protections and was verified as successful through sample confirmation. O&M had minor but correctable issues with freezing lines due to condensate, or overheating of a vacuum pump.
- 3) Unusual situations or problems at the site  
Access was somewhat challenging with the local Railroad while planning for the OSA excavation activities. As this is also an active manufacturing facility, all activities were carefully coordinated with site operations to ensure a safe working environment.

Mr. Todd Marshall, Pollution Control Manager  
Winnebago County Health Department  
January 30, 1013  
Phone interview

Mr. Marshall said that he was well aware of the site through the Health Department's inspector registering the groundwater monitoring wells that have been installed as a part of the site remedy and also through permitting the source area extraction wells. Mr. Marshall had no comments with respect to the site remedy as it is being implemented. He did, however, share his concern with the few residents that refuse to connect to the municipal water system. He expressed interest in continuing the effort to either connect those residents or to try to put in place deed notices or other mechanisms that would alert a new owner to the potential health issues using the private wells.

Mr. Tony Buscemi, Owner

Villa di Roma Restaurant

Source Area 11

January 31, 1013

On-site interview, with Mike Joyce, Community Involvement Coordinator

Anthony Buscemi owns the Villa Di Roma restaurant at 1620 Harrison Avenue in Rockford, Illinois. His establishment is about three miles east of the Hamilton Sunstrand plant and within the boundaries of the site's ground-water plume. Mr. Buscemi is very familiar with the history of the Superfund site and noted that some test wells were installed on his property in the past. However, Mr. Buscemi says he is unconcerned with the pollution present in the ground water beneath the restaurant because his establishment is served by the Rockford municipal water system. He disclosed that ten years ago the City of Rockford agreed to buy his property to further the city's redevelopment plans. For that reason, Mr. Buscemi says he purchased vacant land about one mile away at 20<sup>th</sup> St. and Harrison Ave. He says he bought this land in order to relocate his restaurant if and when the City of Rockford buys his current location as agreed. This land is also within the site's ground-water plume. However, once again, Mr. Buscemi said that he is unconcerned. Because, he explained, if he builds at that location, his new restaurant will also be served by the city's municipal water system. Remedial Project Manager Tim Drexler provided Mr. Buscemi with details about past and current remedial activities concerning various areas of the Superfund site, as well as plans for future work. He then asked the restaurant owner if he had any questions about the site: past, present or future. Mr. Buscemi said he appreciated the information but had no questions concerning the Superfund site. Tim Drexler also asked Mr. Buscemi if he had any information about the site he wished to provide EPA and the restaurant owner said he did not.

Mr. Tim Holdeman, Water Superintendent

City of Rockford, Illinois

OU 2

February 4, 2012

Telephone Interview, with Doyle Wilson, IEPA

Mr. Holdeman was pleased with the updated plume map created by EPA for the SERGWC site and that semiannual groundwater monitoring data being collected by the City of Rockford was useful to track the progress of the overall VOC plume. The City would like EPA and IEPA to evaluate the existing monitoring wells in the city's system to make sure that there are no wells that are no longer useful. The City is also concerned with the future of city water supply Well #35, located at 2944 Bildahl Street. This well currently has installed a GAC unit to remove site-related VOCs. Mr. Holdeman is concerned that if concentrations of VOCs in the well increase significantly, the City might no longer be able to maintain treatment to drinking water standards and have to plug the well. He asked whether EPA or IEPA had considered generating a predictive model to determine whether there might be an increase in the concentrations of VOCs into Well #35 in the future. Mr. Holdeman stated that the city is considering contracting with a hydrologist to generate a predictive model of the SERGWC site plume and asked whether EPA

or IEPA would be interested in any updates on the city's plans. Both EPA and IEPA expressed interest in providing input into the generation of a plume model by the city.

Mr. Holdeman expressed continued interest in determining whether there were any other residents still on private water wells within the SERGWC site plume besides the four already identified. He expressed his desire to continue to work with EPA and IEPA to make sure that any resident or business still on a private well is made aware of the potential risks and that the city will work with EPA and IEPA to eliminate private water wells in the SERGWC plume area.

Mr. Holdeman had no other issues or concerns with remedial design or remedial actions being taken at the four identified site source areas.

Mr. Glen Ekberg

Land Owner of part of SER Area 7, Rockford, Illinois

OU 3

February 5, 2012

Telephone Interview with Glen Ekberg, Doyle Wilson, IEPA, and Tim Drexler, USEPA

Mr. Ekberg said that he generally had no information on the progress of the overall site, so he didn't have an opinion on the whole remedy. He said that he would like to work the farm located on his property in order to make it productive to pay the property taxes, but said that he needed the blessing of the EPA to do so. It was Mr. Ekberg's understanding from the regulatory agencies that he couldn't do anything with the property he owns at SER Area 7. He would like to clean up the property by planting alfalfa east of the new remedial well locations. He said that his research indicated that alfalfa would help remediate VOCs so he thought this would be a good way to help clean up the site. Mr. Ekberg said that the farmer that had been working the farm would also harvest the alfalfa. He also said he found research that indicates cottonwood trees (one type is better than just plain ones) are good at remediating VOCs. He has offered in the past to plant some of these trees.

On the northern edge of his property, Mr. Ekberg said there have been some discussions of building a train station. He thinks that a train station would be a very good use of the property. However, he said, since his property has been designated a Superfund site, the City's discussions have focused on placing the train station in downtown Rockford. Mr. Ekberg would like to get a no further remediation required determination for at least the area where a proposed train station and parking lot would go. He thinks that getting that determination would help convince the City of Rockford to select his site for, at least, a smaller satellite station.

Mr. Ekberg stated that a home owner adjacent to the west end of his property wanted to buy a small strip of his land and that Mr. Ekberg would like to sell that portion to the home owner. But, he said that the EPA would make the transfer too complicated and difficult. He didn't want to require the imposition on the home owner that he has to live with on his property. So, he didn't sell the strip of land to the home owner.

Mr. Ekberg sees the future use of this land to continue to be farm ground with the possible



exception of a portion of the property to the north which might be used as a train station.

Mr. Ekberg asked for a continuing dialog with the environmental agencies regarding the remediation efforts to help them be as practical and cost effective as possible. He also asked to see the write-up of the conversation. IEPA and EPA agreed to these requests.

**ATTACHMENT 1:    REVIEW OF SOUTHEAST ROCKFORD SITE HUMAN HEALTH  
PROTECTIVENESS**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 5  
9311 GROH ROAD  
GROSSE ILE, MI 48138

**MEMORANDUM**

**SUBJECT:** Review of the Protectiveness of the Site Remedy for the Southeast Rockford Site

**FROM:** Keith Fusinski, PhD Toxicologist US EPA  
Superfund Division, Remedial Response Branch #1, Remedial Response Section #1

**TO:** Timothy Drexler, Remedial Project Manager, US EPA  
Superfund Division, Remedial Response Branch #2, Remedial Response Section #5

**DATE:** 12/4/2012

**STATEMENT OF THE ISSUES**

RPM Drexler requested a review of the site remedy defined in the 1995 Record of Decision (ROD) for the Southeast Rockford site to determine if it is still protective by current standards.

**BACKGROUND**

(The following information is taken from the 1995 ROD for the Southeast Rockford Site (IEPA – 1995)) The Southeast Rockford Groundwater Contamination Site is located in a residential and commercially zoned area in the southeast portion of Rockford, Illinois. When the site was originally listed on the National Priorities List (NPL), the nature and extent of groundwater contamination was largely unknown. As groundwater data from residential and monitoring wells has been collected, the project "study area" was initially expanded from the original NPL description to include an area of about five square miles.

The study area is a predominantly suburban residential area with scattered industrial, retail and commercial operations throughout. Most of the building structures at this site are one or two story residential dwellings, but several industrial areas also exist next to residential areas along Harrison Avenue. There are a substantial number of commercial and retail operations along Alpine Road, Eleventh Street and Kishwaukee Street. The topography of the site is essentially flat-lying, with gradual sloping towards the Rock River. There are four major identified source areas of groundwater contamination at the site. Other groundwater plumes in the study area were investigated, but were not determined to be sources of chlorinated volatile organic compounds (VOCs) found in residential wells, such as 1,1,1-trichloroethane (TCA) and dichloroethene (DCA). Because of a relative abundance of groundwater resources, the City of Rockford's

primary source of potable water is groundwater. The Rock River to the west of the site is not used as a source of drinking water.

The site was proposed for inclusion to the NPL on June 24, 1988 and was formally added to the NPL on March 31, 1989 as a State-lead, federally funded Superfund site. The USEPA identification number for this site is ILD981000417.

The remedy selected in the 1995 ROD included controls to restrict public usage of (and therefore exposure) to site-related contaminated groundwater in conjunction with the quarterly monitoring. Usage of groundwater was restricted within the modeled 70 year TCA/DCA contaminant plume plus a "buffer zone" by providing all households and businesses with potable use wells an opportunity to hook up to city water. Because of their prevalence in groundwater at the site, TCA and DCA were modeled to simulate a lifetime exposure. Other less common (and more toxic) groundwater compounds, while not having been modeled in the Remedial Investigation, are expected to exist within this 70 year TCA/DCA plume and buffer zone. The use of these contaminants in groundwater modeling resulted in a conservative determination as to the number of hookups that were offered in this remedy.

Further remediation at the identified source areas and the continued use of a granulated activated carbon (GAC) unit installed at the municipal well were included in this remedy. All homes and businesses that received hookups in this remedy were compelled to abandon their potable use wells in accordance with State laws. Water quality for those properties receiving municipal hookups were guaranteed by the City of Rockford's extensive monitoring program.

## **ANALYSIS AND CONCERNS**

The remedy selected in the 1995 ROD remains protective for the drinking water pathway. However, the current concentrations of the VOCs in the groundwater plume at the site are above screening levels for potential vapor intrusion into residential dwellings. Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. In extreme cases, the vapors may accumulate in dwellings or occupied buildings to levels that may pose near-term safety hazards (e.g., explosion), acute health effects, or aesthetic problems (e.g., odors).

The vapor intrusion pathway is considered complete when the vapors move from the source (or groundwater contamination) through the deep soil and subsurface soil gas, and into a structure. Each of these components must exist in order for the pathway to be considered complete. It is possible for volatile compounds to impact deep and subsurface soil gas but still not impact indoor air. In this case the pathway would not be considered complete and no mitigation would be required.

The Illinois Environmental Protection Agency (IEPA) released a vapor intrusion study of residential homes near the source areas of the VOC plumes at the Southeast Rockford Site in 2004 (IEPA – 2004). IEPA evaluated residential neighborhoods in Areas 4 and

the area directly east, and downgradient of, Area 7 and found there was no potential for vapor intrusion at the site. However, in Area 4 there were 8 soil gas samples which had VOCs above the screening levels out of 19 samples. Additionally, there were a number of soil gas samples which had VOC concentrations above VISL levels which did not have adjacent properties evaluated. There was one house which had indoor air evaluated in area 4 which was not adjacent to a soil gas sample with VISL exceedances (Figure 1 - note that the locations of 2 soil gas samples were not defined). The study area east of Area 7 had 2 soil gas samples out of 23 which had VOCs above the screening levels ((Figure 2 – note that 1 VISL exceedance location was not defined). There were 5 houses in this area which had indoor air evaluated, of which only one was adjacent to a soil gas sample with VISL exceedances.

As stated in many vapor intrusion guidances, due to temporal and seasonal variation it is recommended that multiple rounds of subslab and indoor air sampling be performed at least quarterly before a site can be determined to not be affected by vapor intrusion (US EPA 2002, US EPA 2010, ITRC 2007). As such, it is recommended that further investigation be performed in residential neighborhoods where groundwater VOC concentrations are above vapor intrusion screening levels. A tiered approach should be taken when analyzing for vapor intrusion. After groundwater concentrations are determined to be over a set screening level, then deep soil gas should be evaluated. If the soil gas concentrations are above screening levels, subslab soil gas vapor of structures within 100 feet should be evaluated. Structures with subslab concentrations above a set screening level should then have their indoor air tested. It is also appropriate to collect subslab and indoor air at the same time for the convenience of the resident. The 2004 IEPA vapor intrusion report described indoor air evaluations for houses that had soil gas levels below the soil gas screening levels. Based upon the tiered approach, since the soil levels were below vapor intrusion screening levels, the buildings in these areas did not meet the criteria for indoor air sampling.

When compared to the most recent vapor intrusion screening levels (USEPA 2012), the 2012 groundwater data has numerous exceedances of vapor intrusion screening levels (MCL or VISL) throughout the site (Appendix A). It is recommended that deep soil gas samples be collected in the areas near residential or commercial properties which have exceedances of the concentrations of the contaminants of concern (COCs) based on the most recent vapor intrusion screening levels (Figure 3). If the soil gas in these locations has concentrations of COCs above screening levels, then screening for the remaining vapor intrusion tiers is recommended.

## REFERENCES

IEPA – 1995. Illinois Environmental Protection Agency. Declaration of the Record of Decision. Groundwater Response Action. Southeast Rockford Groundwater Contamination Site. Rockford Illinois. September 1995.

IEPA – 2004. Illinois Environmental Protection Agency. Technical Memorandum – Southeast Rockford Indoor Air Sampling Study FINAL. June 22, 2004.

ITRC – 2007. Interstate Technology & Regulatory Council. Technical and Regulatory Guidance. Vapor Intrusion Pathway: A Practical Guideline. January 2007

US EPA - 2002. United States Environmental Protection Agency. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 2002.

US EPA – 2010. United States Environmental Protection Agency - Region 5. Vapor Intrusion Guidebook. October 2010.

US EPA – 2012. Vapor Intrusion Screening Level Calculator.  
<http://www.epa.gov/oswer/vaporintrusion/index.html>

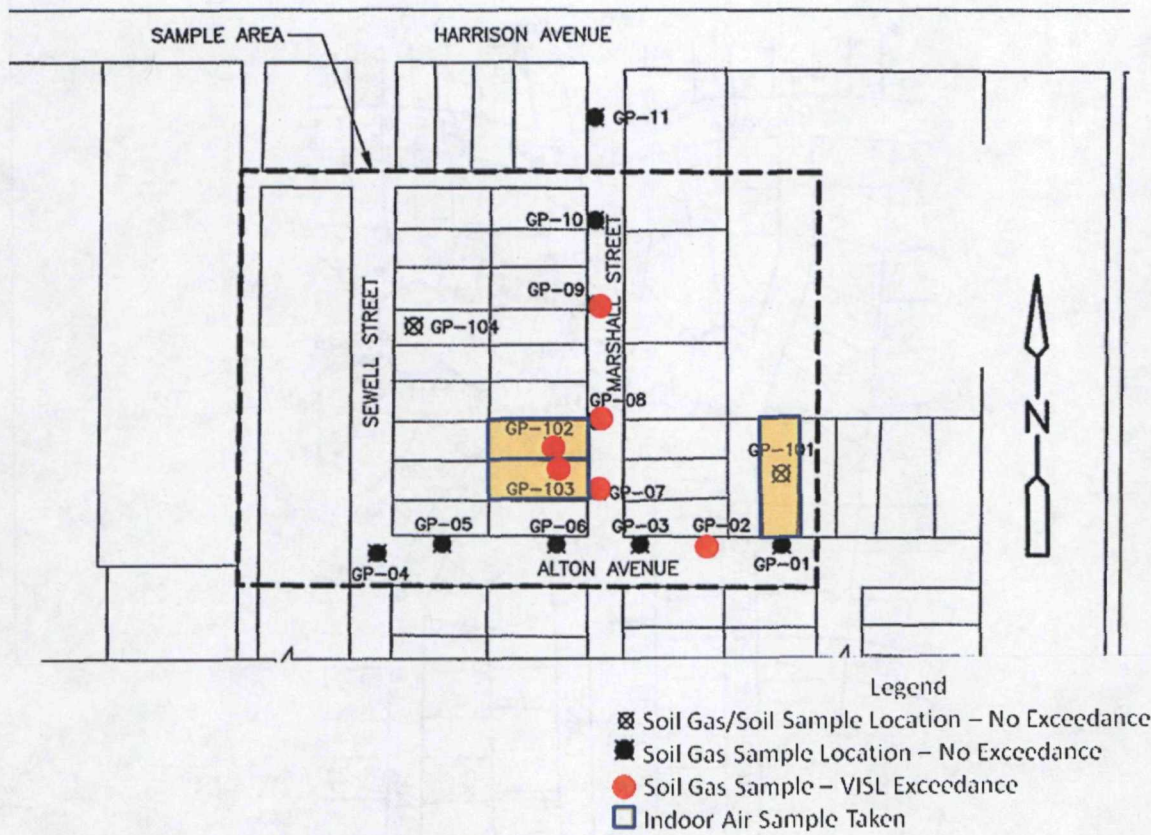
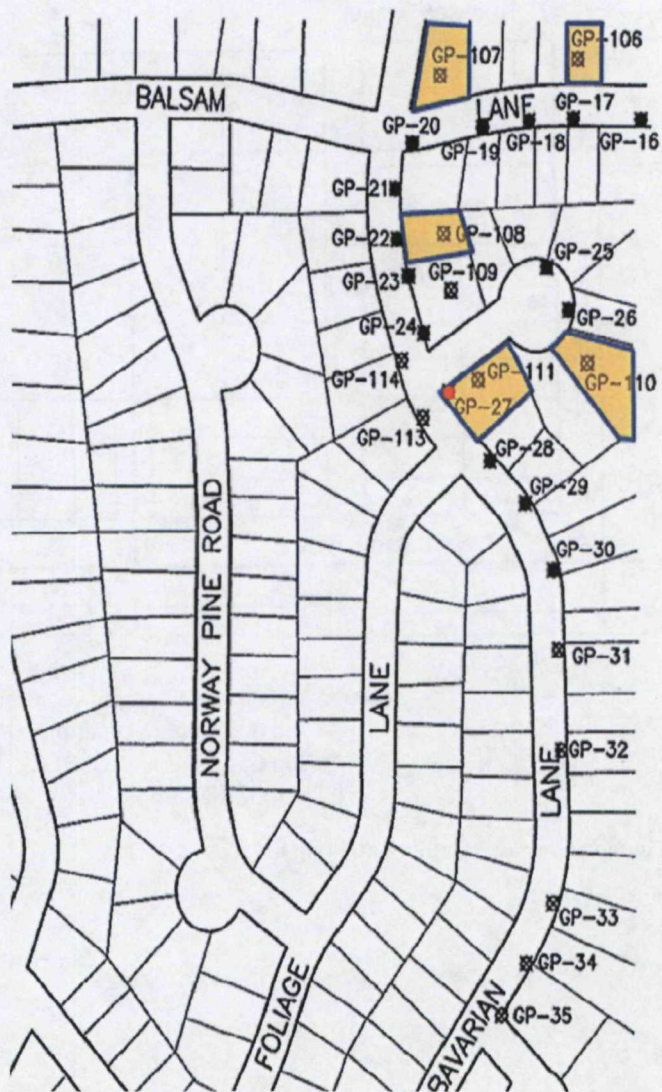


Figure 1. 2004 soil gas and indoor door air sampling at Area 4.





Legend

- ☒ Soil Gas/Soil Sample Location – No Exceedance
- Soil Gas Sample Location – No Exceedance
- Soil Gas Sample – VISL Exceedance
- Indoor Air Sample Taken

Figure 2. 2004 soil gas and indoor door air sampling at the area east of Area 7.





Figure 3. 2012 Groundwater VISL Exceedance Locations.



Appendix A.  
Southeast Rockford NPL Site  
Summary of Groundwater Analytical Results  
June 2012 Sampling Event  
1 of 5

Compound	MCL	1x10 <sup>-5</sup> VISL Groundwater Screening Levels ug/L	MW-16	MW-47	MW-101A	MW-101B	MW-101C	MW-101D	MW-102A	MW-102B
			06/28/12	06/26/12	06/25/12	06/25/12	06/25/12	06/25/12	06/27/12	06/27/12
Chloroform	N/A	7.1	1.1	1.0U	5.2J	1.9J	1.4J	1.1	1.0U	1.0U
1,1-Dichloroethane	N/A	66	72	1.0U	320	120	89	47	79	2.7
1,2-Dichloroethane	5	MCL	1.0U	1.0U	10U	5.0U	2.5U	1.0U	1.0U	1.0U
1,1-Dichloroethene	7	MCL	5.2	1.0U	72	25	17	14	1.4	1.0U
cis-1,2-Dichloroethene	70	MCL	25	1.0U	1600	47	89	33	160	3.8
trans-1,2-Dichloroethene	100	MCL	3.3	1.0U	66	4.3J	3.3	1.8	5.1	1.0U
Methylene Chloride	5	MCL	5.0U	5.0U	2.7J	25U	12U	5.0U	5.0U	5.0U
Tetrachloroethene	5	MCL	11	0.29J	56	24	16	12	1.0U	1.0U
1,1,1-Trichloroethane	200	MCL	120	1.0U	650	430	300	150	52	1.0U
Trichloroethene	5	MCL	41	1.0U	190	27	20	19	13	1.0U
Vinyl chloride	2	MCL	1.0U	1.0U	10U	5.0U	2.5U	1.0U	1.0U	0.32J



Appendix A.  
Southeast Rockford NPL Site  
Summary of Groundwater Analytical Results  
June 2012 Sampling Event  
2 of 5

Compound	MCL	1x10 <sup>-5</sup> VISL Groundwater Screening Levels ug/L	MW-102C	MW-113A	MW-113B	MW-114A	MW-114B	MW-117B	MW-117C	MW-117D
			06/28/12	06/25/12	06/25/12	06/27/12	06/28/12	06/26/12	06/26/12	06/26/12
Chloroform	N/A	7.1	1.2J	1.1	0.48J	0.21J	1.0U	0.3J	0.4J	0.41J
1,1-Dichloroethane	N/A	66	130	100	60	4.3	1.1	5.9	25	43
1,2-Dichloroethane	5	MCL	5.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U
1,1-Dichloroethene	7	MCL	33	14	14	5.6	1.0U	2.6	17	11
cis-1,2-Dichloroethene	70	MCL	550	48	98	3	1.8	0.77J	14	2.8
trans-1,2-Dichloroethene	100	MCL	4.4J	5.3	1.9	1.0U	1.0U	1.0U	1.0U	1.0U
Methylene Chloride	5	MCL	25U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Tetrachloroethene	5	MCL	7.3	13	3.6	1.0U	1.0U	5.9	23	22
1,1,1-Trichloroethane	200	MCL	55	140	17	71	1.0U	7.8	37	33
Trichloroethene	5	MCL	30	48	28	4.2	6.5	5.7	15	12
Vinyl chloride	2	MCL	5.0U	1.0U	9.4	1.0U	1.0U	1.0U	1.0U	1.0U



Appendix A.  
Southeast Rockford NPL Site  
Summary of Groundwater Analytical Results  
June 2012 Sampling Event  
3 of 5

Compound	MCL	1x10 <sup>-3</sup> VISL Groundwater Screening Levels ug/L	MW-119	MW-121	MW-124	MW-130	MW-133A	MW-133B	MW-133C	MW-136
			06/27/12	06/27/12	06/27/12	06/25/12	06/28/12	06/28/12	06/28/12	06/25/12
Chloroform	N/A	7.1	0.29J	0.86J	5.0U	0.26J	1.0U	5.2J	5.7	0.62J
1,1-Dichloroethane	N/A	66	0.97J	21	420	7.7	1.0U	180	51	1.0U
1,2-Dichloroethane	5	MCL	1.0U	1.0U	5.0U	1.0U	1.0U	10U	1.6	1.0U
1,1-Dichloroethene	7	MCL	1.0U	5.5	17	1.9	1.0U	25	40	1.0U
cis-1,2-Dichloroethene	70	MCL	0.88J	5.1	100	3	0.4J	1200	130	1.0U
trans-1,2-Dichloroethene	100	MCL	1.0U	0.62J	5.0U	1.0U	1.0U	60	1.7	1.0U
Methylene Chloride	5	MCL	5.0U	5.0U	25U	5.0U	5.0U	11J	5.0U	5.0U
Tetrachloroethene	5	MCL	1.0U	1.6	9.5	0.65J	1.0U	65	6.6	1.0U
1,1,1-Trichloroethane	200	MCL	1.1	10	90	68	0.3J	470	150	1.0U
Trichloroethene	5	MCL	1.0U	19	5.2	2.1	1.0U	92	81	1.0U
Vinyl chloride	2	MCL	1.0U	1.0U	23	1.0U	1.0U	10U	1.0U	1.0U



Appendix A.  
Southeast Rockford NPL Site  
Summary of Groundwater Analytical Results  
June 2012 Sampling Event  
4 of 5

Compound	MCL	1x10 <sup>-3</sup> VISL Groundwater Screening Levels ug/L	MW-200	MW-201	MW-202	MW-203	MW-204	MW-205A	MW-205B	MW-206A
			06/25/12	06/27/12	06/27/12	06/28/12	06/27/12	06/28/12	06/28/12	06/26/12
Chloroform	N/A	7.1	1.0U	1.0U	1.0U	1.0U	0.63J	0.4J	0.43J	0.6J
1,1-Dichloroethane	N/A	66	1.0U	8	0.46J	1.0U	5.5	21	21	7.8
1,2-Dichloroethane	5	MCL	1.0U	1.0U	1.0U	1.0U	1.2	1.0U	1.0U	1.0U
1,1-Dichloroethene	7	MCL	1.0U	1.0U	1.0U	1.0U	7.1	13	13	3.7
cis-1,2-Dichloroethene	70	MCL	1.0U	0.75J	1.0U	1.0U	30	5.7	8.2	1.8
trans-1,2-Dichloroethene	100	MCL	1.0U	1.0U	1.0U	1.0U	1.3	1.0U	1.0U	1.0U
Methylene Chloride	5	MCL	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Tetrachloroethene	5	MCL	1.0U	1.9	1.4	10	1.7	24	23	4.4
1,1,1-Trichloroethane	200	MCL	1.0U	5.8	0.94J	1.0U	5.8	30	30	11
Trichloroethene	5	MCL	1.0U	0.44J	1.0U	0.41J	54	16	15	6.9
Vinyl chloride	2	MCL	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U



Appendix A.  
Southeast Rockford NPL Site  
Summary of Groundwater Analytical Results  
June 2012 Sampling Event  
5 of 5

Compound	MCL	1x10 <sup>-3</sup> VISL Groundwater Screening Levels ug/L	MW- 206B	MW- 206C	MW-207	MW- 102B(d)	MW- 114B(d)
			06/26/12	06/26/12	06/26/12	06/27/12	06/28/12
Chloroform	N/A	7.1	1	1.0U	0.27J	1.0U	1.0U
1,1-Dichloroethane	N/A	66	69	5.8	1.4	2.7	1.1
1,2-Dichloroethane	5	MCL	2.4	1.0U	1.0U	1.0U	1.0U
1,1-Dichloroethene	7	MCL	80	3.8	0.4J	1.0U	0.41J
cis-1,2-Dichloroethene	70	MCL	130	6.1	1.2	3.9	1.8
trans-1,2-Dichloroethene	100	MCL	0.44J	1.0U	1.0U	1.0U	1.0U
Methylene Chloride	5	MCL	5.0U	5.0U	5.0U	5.0U	5.0U
Tetrachloroethene	5	MCL	10	1.0U	1.3	1.0U	1.0U
1,1,1-Trichloroethane	200	MCL	58	1.0U	2.2	1.0U	1.0U
Trichloroethene	5	MCL	46	19	3.9	1.0U	6.7
Vinyl chloride	2	MCL	0.86J	1.0U	1.0U	0.31J	1.0U

(d) Field duplicate

All units in micrograms per liter (µg/l) or parts per billion (ppb)

Bold value and outlined cell denotes analytical result > than MCL

Yellow cell indicates concentration greater than Vapor Intrusion Screening Level

**ATTACHMENT 2:    REVIEW OF SOUTHEAST ROCKFORD SITE ECOLOGICAL  
PROTECTIVENESS**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5**

**DATE:** December 11, 2012

**SUBJECT:** Ecological Issues, SE Rockford Groundwater Contamination Site,  
Rockford, Illinois

**FROM:** James Chapman, Ph.D., Ecologist

**TO:** Tim Drexler, RPM

**Summary**

Potential ecological risks associated with discharge of groundwater contaminants of concern (COC) to the Rock River are evaluated in this memo. Adverse ecological effects on benthic organisms cannot be ruled out with the available information. Based on data for the monitoring wells close to the river, the COCs for potential ecological risk are 1,1,1-TCA and TCE. One additional COC, 1,1-DCE, was reported at the screening value in one well.

Potential ecological risk is conservatively evaluated in a screening-level assessment based on comparison of groundwater monitoring data for the wells located within 3000 ft of the Rock River and ecologically-based surface water benchmarks, under the assumption that COCs will discharge to the river at the same concentrations reported in nearby monitoring wells. Risk is evaluated for aquatic organisms exposed to sediment pore water in groundwater discharge zones without dilution by river water.

Sampling river sediment pore water for COCs is recommended to reduce exposure uncertainty.

Options for reducing effects uncertainty are also discussed.

**Discussion**

Potential risks to ecological receptors in the Rock River from discharge of contaminated groundwater are assessed for benthic organisms under the simplifying assumptions that benthic organisms in areas of groundwater discharge are exposed through sediment pore water consisting of undiluted groundwater as represented by data reported for the groundwater monitoring wells close to the river (within 3000 ft of the river bank). Data for the following monitoring wells are included in this evaluation: MW-117B, 117C, 117D, 204, 205A, 205B, 206A, 206B, 206C, 207, and IW19.

There are no federally recommended ambient water quality criteria (AWQC) for protection of freshwater biota for any of the groundwater COCs, so ecologically-based screening values were compiled from two sources: Canadian Council of the Ministers of the Environment Water Quality Guidelines for the Protection of Aquatic Life (CCME WQG) for long term exposure to



freshwater aquatic life, and Oak Ridge National Laboratory Tier II Secondary Chronic Values (ORNL SCV) for freshwater aquatic biota (Table 1). Tier II benchmarks may be calculated when the freshwater biota toxicity data for a chemical are not available for all of the taxonomic groups required for calculating an AWQC<sup>1</sup>. The procedure for calculating SCVs is presented in Suter and Tsao 1996 Appendix B.

<b>Table 1. Site Cleanup Levels and Ecologically-based Freshwater Screening Values (µg/l)</b>			
Analyte	Site Cleanup Level or MCL	CCME WQG freshwater, long term	ORNL SCV
1,1,1-Trichloroethane (1,1,1-TCA)	200		<b>11</b>
1,1,2-Trichloroethane (1,1,2-TCA)	<b>5</b>		1200
1,1-Dichloroethene (1,1-DCE)	7		25
1,2-Dichloroethane (1,2-DCA)	<b>5</b>	100	910
Total 1,2-Dichloroethene	<b>170</b>		590
Benzene	<b>5</b>	370	130
Ethylbenzene	700	<b>90</b>	
Methylene chloride (Dichloromethane)	<b>5</b>	98.1	2200
Tetrachloroethene (PCE)	<b>5</b>	110	
Toluene	1000	<b>2</b>	9.8
Trichloroethene (TCE)	<b>5</b>	21	47
Vinyl chloride	<b>2</b>		
Total xylenes	10,000		<b>13</b>
Beryllium	4		<b>0.65</b>

**Bold – lowest value**

Site Cleanup Level or Maximum Contaminate Level (MCL): Statistical Analysis of Chemical Concentrations in Groundwater and Mapping. SSP-1164-021 SE Rockford Goundwater Contamination Site. Memo from Dominique Sorel, Liz Jones and Matt Tonkin, S.S. Papadopoulos & Associates, Inc., to Tim Drexler and David Wilson, U.S. EPA Region 5, 9/24/2012.

CCME WQG: CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater, Long Term: Canadian Environmental Quality Guidelines Summary Table (no date). Canadian Council of Ministers of the Environment (downloaded 10/19/2011). [http://www.ccme.ca/publications/ceqg\\_rcqe.html](http://www.ccme.ca/publications/ceqg_rcqe.html)

ORNL Secondary Chronic Value (SCV): Suter, G. and C. Tsao. 1996. Toxicological Benchmarks of Potential Contaminants of Concern for Effects on Aquatic Biota on Oak Ridge Reservation: 1996 Revision. ES/ER/TM-96/R2. Oak Ridge National Laboratory, Oak Ridge, TN. 104 p.  
[http://www.esd.ornl.gov/programs/ecorisk/benchmark\\_reports.html](http://www.esd.ornl.gov/programs/ecorisk/benchmark_reports.html)

Ecologically-based screening values were located for all of the groundwater COCs with the exception of vinyl chloride. For the majority of the groundwater COCs, the site cleanup levels or

<sup>1</sup> The minimum data requirement for Tier I calculation of AWQC includes toxicity test results for 3 species of fish from 3 different families (with specifications regarding family selection), 2 species of crustacea (1 benthic and 1 planktonic), 1 aquatic insect species, 1 aquatic species not in the Arthropoda or Chordata phyla, and 1 species from an insect order or a phylum not represented by any of the above, with additional requirements for calculating AWQC for chronic exposure.

MCLs are lower than the corresponding benchmarks for freshwater organisms. However, the ecological screening values are lower than the site cleanup levels or MCLs for 5 of the groundwater COCs: 1,1,1-TCA, ethylbenzene, toluene, xylene, and beryllium (Table 1).

Exceedances of ecologically-based screening values in groundwater monitoring wells within 3000 feet of the Rock River are summarized in Table 2.

<b>Table 2. Summary of Monitoring Wells with Ecologically-based Benchmark Exceedance within 3000 feet of the Rock River</b>			
Well Name	Analyte	UCL (µg/l)	HQ (ratio)
MW-117B	1,1,1-TCA	29.4	3
MW-117C	1,1,1-TCA	59.6	5
	1,1-DCE	26.6	1
	TCE	24.1	0.5 – 1
MW-117D	1,1,1-TCA	54.8	5
MW-204	TCE	75.8	2 – 4
MW-205A	1,1,1-TCA	56.7	5
	TCE	29.8	0.6 – 1
MW-205B	1,1,1-TCA	61.2	6
	TCE	28.3	0.6 – 1
MW-206A	1,1,1-TCA	26.7	2
MW-206B	1,1,1-TCA	59.2	5
	TCE	42.6	0.9 – 2
MW-206C	TCE	25.1	0.5 – 1
IW19	1,1,1-TCA	64.0	6

Analyte chemical name – see Table 1.

UCL – Upper Confidence Limit concentration, except IW19, which is the most recent datum (UCL not reported).

Monitoring well data as reported in Table 2.1 and Attachment 1 in Statistical Analysis of Chemical Concentrations in Groundwater and Mapping. SSP-1164-021 SE Rockford Groundwater Contamination Site.

Memo from Dominique Sorel, Liz Jones and Matt Tonkin, S.S. Papadopoulos & Associates, Inc., to Tim Drexler and David Wilson, U.S. EPA Region 5, 9/24/2012.

HQ – Hazard Quotient calculated as UCL or most recent datum / Ecologically-based screening level (Table 1).

HQs are rounded to 1 significant digit. TCE HQ range = UCL / ORNL SCV to UCL / CCME WQG.

There are no exceedances in MW-207.

Adverse effects on aquatic organisms cannot be ruled out for 1,1,1-TCA and TCE. An additional COC, 1,1-DCE was reported right at the benchmark. 1,1,1-TCA exceeded the screening value in 8 of the 11 monitoring wells within 3000 feet of the Rock River. 1,1-DCE met the screening value in one well (MW-117C). TCE exceeded the screening value in 2 of the wells when compared to the CCME WQG, and equaled it in 4 more wells, but exceeded the ORNL SCV in only 1 well. None of the other COCs exceeded ecological benchmarks in monitoring wells within 3000 ft of the Rock River (beryllium and vinyl chloride could not be assessed – the former because monitoring data have not been collected, the latter because an ecological benchmark was not located).

The two major uncertainties associated with the screening-level assessment concern the actual COC concentrations in river sediment pore water (exposure), which are conservatively assumed to be equal to that reported in wells within an arbitrary distance from the river, and the toxicities of the COCs to the benthic organisms at the site (effects), which are conservatively derived from limited toxicological datasets. Some options are briefly described below for reducing each of these uncertainties.

The single most useful and cost-effective approach would be to reduce exposure uncertainty by sampling river sediment porewater for COCs. If they are not detected in porewater in upwelling areas, the contaminated plume has not reached the river (or does not discharge to the river), and there would be no complete exposure pathway to aquatic life. If COCs are detected above ecological benchmarks, exposures would be unacceptably high for aquatic life, in particular, benthic organisms and bottom feeders.

Deployment of semi-permeable membrane devices (SPMDs), an alternative approach for gathering river bottom exposure data, is not recommended because of possible complications in VOC recovery.

There are several options for attempting to reduce uncertainty regarding effects, but none are as straightforward as porewater sampling to reduce exposure uncertainty. The ecotoxicological database for volatile organic chemicals (VOCs) is sparse compared to other chemicals of concern because of the inherent difficulties of maintaining exposure concentrations of volatile chemicals that rapidly partition out of water. For this reason, laboratory toxicity testing of field-collected sediment or water samples is not recommended.

*In situ* toxicity tests (performed in the field) use standard aquatic test organisms in open-bottomed chambers inserted in the sediments (with screens to prevent loss or ingress of organisms). It requires a high level of skill to implement and maintain, and is expensive, but can generate high quality data if performed properly.

Another option is to install recoverable artificial substrate, such as Hester-Dendy (H-D) samplers or barbeque baskets (rock-filled enclosures) to compare colonization in near site upwelling areas and reference locations. H-D samplers need to be placed as close to the bottom as feasible in upwelling areas. An uncertainty with H-D samplers is the amount of dilution of VOCs compared to that experienced by benthic organisms.

A third option is to perform benthic surveys to compare native benthic life in near site upwelling areas and reference locations. The technique is best developed for wadable streams with a mix of benthic habitats, and may be less informative in non-wadable or soft-bottomed water bodies.